

THE IRON AGE



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Contents—January 31, 1935

With Apologies to Aesop	11
Durable Goods Recovery Depends on Profits and Confidence	12
Grinding Operations on Acme-Gridley Parts	16
How to Measure and Specify Surface Finish	23
Rustless Steel Production Approaches Peak Level	27
From Tungsten Powder to Finished Carbide Tools	30
Furnace to Harden Valve and Clutch Springs	33
New Equipment	39
News	43
Washington News	47
Automotive Industry	54
Markets	57
Construction and Equipment Buying	74
Products Advertised	96
Index to Advertisers	114

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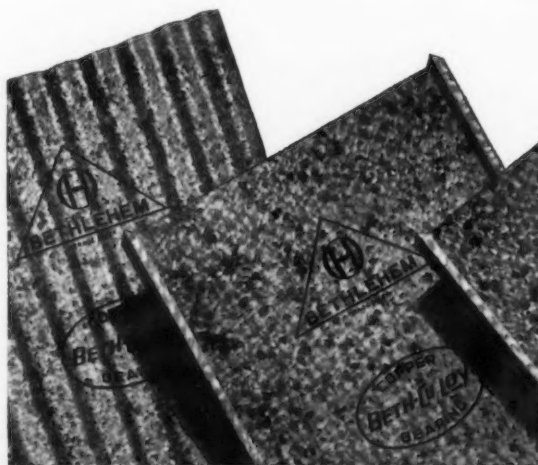
THE groundhog as a weather prophet has gone the way of many another old, mistaken idea that was accepted in a more credulous day.

Take the notion, once widely held but now swiftly passing, that to get a sheet able to defy rust you must pay a fancy price. That's another myth that has been refuted both by modern science and the experience of men who use sheets.

For years the American Society for Testing Materials conducted atmospheric-exposure tests on sheets. This is what they found: That of all the grades of commercial steel and iron, copper-bearing steel stands first by a wide margin in resistance to atmospheric corrosion.

Beth-Cu-Loy Sheets are made of copper-bearing steel. They have from two to

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With Apologies to Aesop

ONCE upon a time, a man who was journeying through the jungle had the misfortune to fall into a tiger trap pit.

Being of a reflective turn of mind, his mishap caused him to ponder upon the sins and shortcomings of his past life, of which there were a considerable number. Meanwhile, of course, although his mind was thus occupied, his hands and feet were engaged in trying to climb out of the pit.

This was not an easy thing to do, since such pits are made with the purpose of retaining what falls into them, so in the course of time his mind turned from the reflection upon his past life to a consideration of his future. "When I escape from this pit," he resolved, "I will turn over a new leaf and become a changed man. I will give to the poor, provide for my indigent relatives, be kind to animals and treat my mother-in-law with respect. I will also improve my property, plant trees and vineyards and build roads so that my neighbors who are less fortunate may have work and wages."

These thoughts were very intriguing to the man in the pit, and the vision of the benefactor that he was to become and the good that he was going to do not only eased his mind of apprehension, but took it away from his more immediate problem of getting himself out of the hole he was in. His physical efforts in behalf of self-preservation therefore became more and more subordinated to the easier and more pleasurable exercise of imagination.

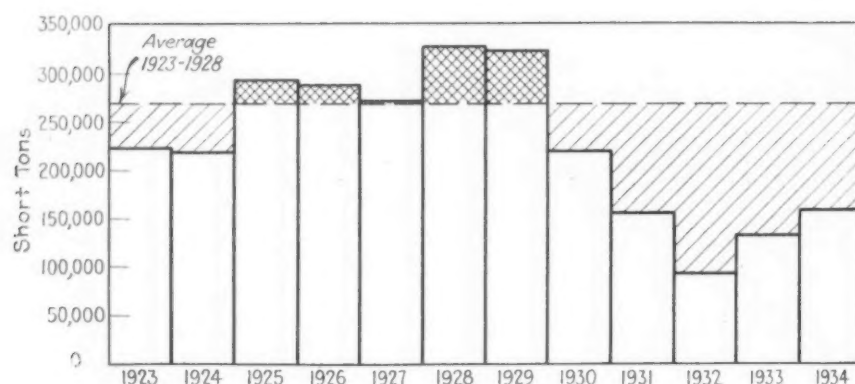
No doubt, after all of this intensive long-range planning for the future, he might indeed have become a great public benefactor, had it not been that a tiger soon fell into the same pit and ate him up.

The moral of this tale, if any, may be that too much long-range planning for the future may not be expedient if it interferes with one's efforts to get out of a hole.

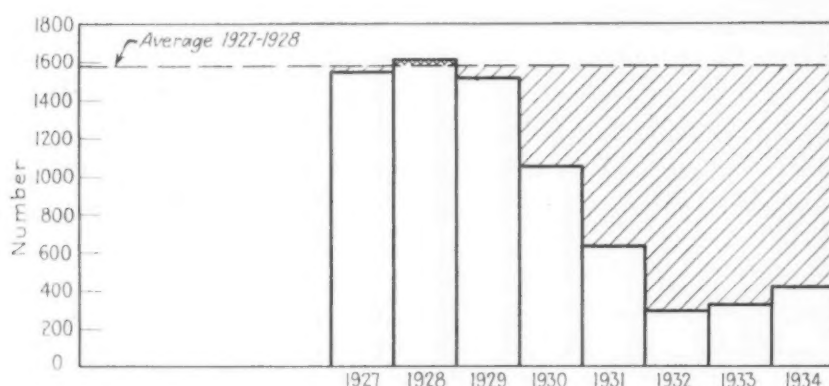
J. H. Lawrence

Durable Goods Recovery Depends

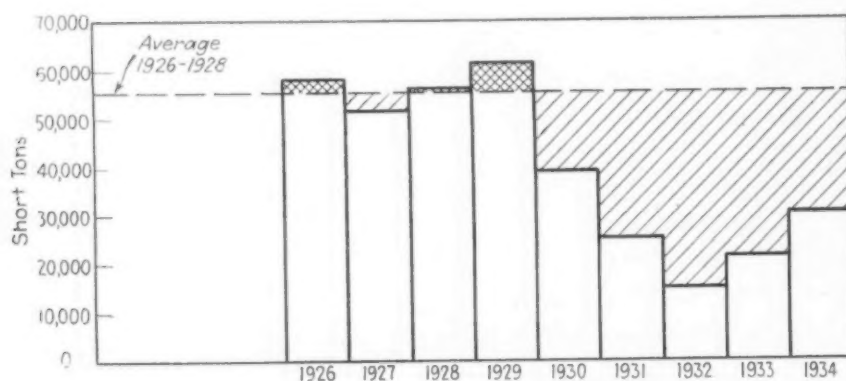
By
DR. FREDERIC DEWHURST



Steel Sheets—Production (Monthly Averages)
Compiled by the National Association of Flat and Rolled Steel Manufacturers, representing almost all the independent sheet makers.



Steel Boilers—New Orders (Monthly Averages)
Compiled by the U. S. Bureau of the Census from reports of 72 firms, about 90 per cent of the industry.



Malleable Castings—Shipments (Monthly Averages)
Compiled by the U. S. Bureau of the Census, represents reports from 130 establishments, covering about 90 per cent of the industry.

EVIDENCE presented in a previous article appearing in the Annual Issue of *THE IRON AGE*, Jan. 3, showing the existence of huge deficiencies in capital equipment, buildings and other types of durable goods, is confirmed by the analysis of operations in several additional lines of heavy industry. Vertical bars in the charts accompanying this article show production or shipment records during recent years for five important fabricated iron and steel products: steel sheets, steel boilers, malleable castings, woodworking machinery and railroad track work; four types of industrial electrical equipment: overhead cranes, industrial trucks and tractors, industrial locomotives and electrical porcelain; and two basic raw materials, lead ore and zinc.

Horizontal dotted lines in each chart show the average monthly rate of operations for the years preceding, but not including, 1929. These averages are a reasonable measure of normal business in the past and furnish a conservative forecast of what may be expected in the future. Heavily shaded portions of the bars measure the extent by which operations in any year exceeded the average, while the lightly shaded areas indicate the approximate deficiency in years when activity fell below normal.

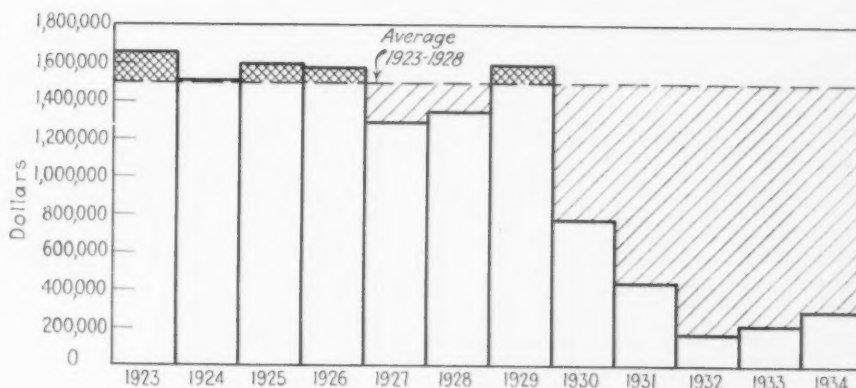
If the difference between the areas above and below the "normal" line may be taken as a rough measure of accumulated shortages,

on Profits and Confidence

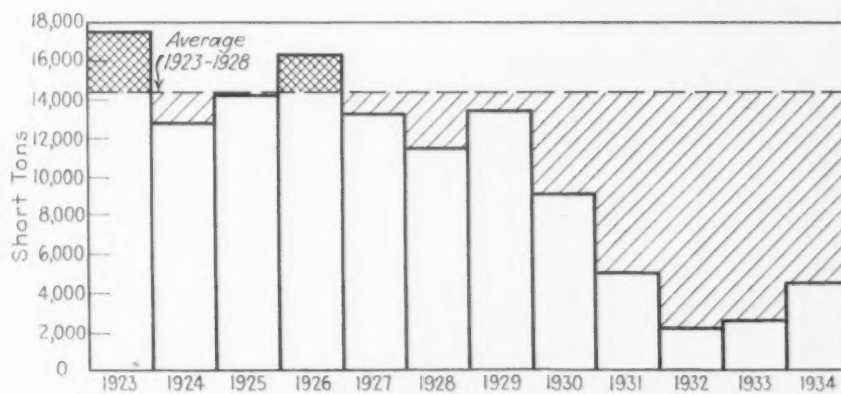
a substantial potential demand now exists for the products of each of these 11 industries. Obviously such crude statistical measures can provide no assurance of future prosperity to any specific industry. New materials, techniques and products will continue to displace old ones, as in the past, and infant industries will take the place of those whose products have been outmoded or have not been adapted to changing consumer needs. Some of these industries, therefore, may fail to attain their "statistical expectancies," while others undoubtedly are destined to expand far beyond the "normal" rate of operations shown in the charts.

Taken in the aggregate, however, these statistical evidences of accumulated shortages reflect the existence of a potential demand for structures, machinery and equipment and other durable goods far in excess of any that has ever before existed. These latent demands, translated into terms of the number of months' operations at the average rate prevailing in each industry prior to 1929 are shown by the horizontal bars in the large chart (on page 15). Accumulated shortages equivalent to four years' operations at the normal rate exist in the case of residential buildings and freight cars, while at least two years' operations will be required to make good existing shortages in 17 out of the total of 22 industries studied. Since these industries may be considered fairly representative, it appears that producers of durable goods are about two and a half years behind schedule in supplying the normal needs of the nation. What this means in terms of future activity is clear when it is realized that to make good 30 months' deferred needs would involve operations for an entire decade at 25 per cent above the normal rate prevailing in the past.

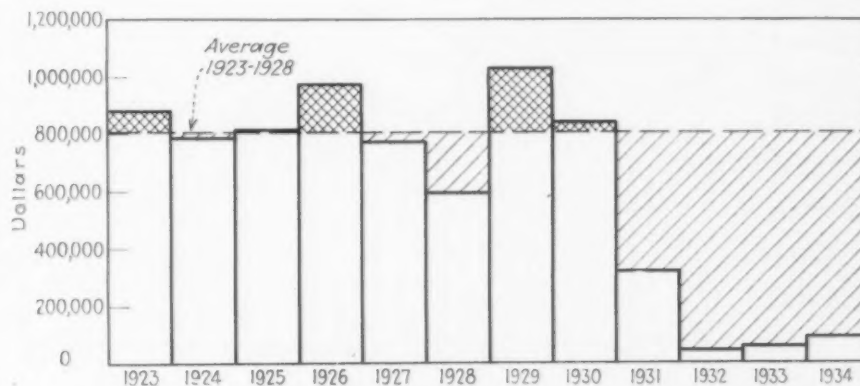
However, a bird in the hand is always worth several birds in the bush. These accumulated shortages



Woodworking Machinery—Shipments (Monthly Averages)
Compiled by the Association of Manufacturers of Woodworking Machinery from reports of its members varying in number from twenty to twenty-nine. In 1925 the shipments reported represented 48 per cent of the total value produced.



Track Work—Production (Monthly Averages)
Compiled by the American Iron and Steel Institute and covers the production of all T-rail track of 60 pounds per yard and heavier, including all special or fabricated track work of carbon steel, manganese steel, and other metals for both domestic and export use.



Electric Overhead Cranes—Shipments (Monthly Averages)
Compiled by the Electric Overhead Crane Institute from reports from eleven manufacturers estimated to cover 98 per cent of the output.

are still birds in the bush. They represent latent, not effective, demand; potential business, not actual orders on the books. What are

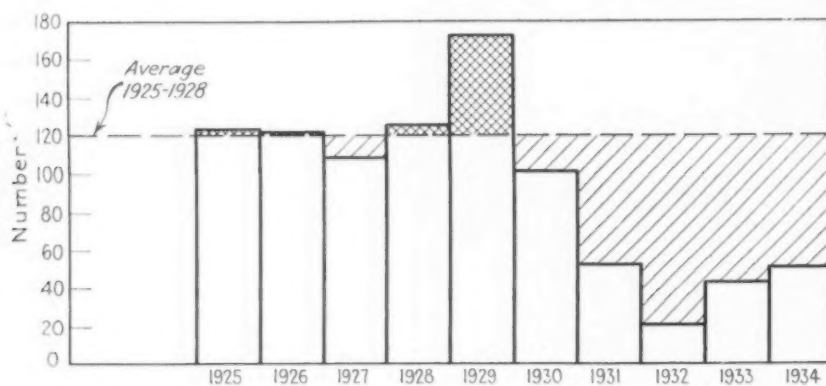
the prospects for these deferred requirements to be translated into new business for producers, bigger pay envelopes for workers now on

the payroll and jobs for the millions of unemployed in the heavy industries?

Perhaps the most encouraging answer to this question is found in the fact that the process has already commenced. Recovery in the heavy industries has been under way for the past two years. In all but two of these 22 industries, 1933 operations were well above the low levels of 1932, with last year's business showing still further gains. In spite of the difficulties and uncertainties of the past year, output of such important products as freight cars, lead ore, malleable castings, industrial electric trucks and tractors, steel sheets, zinc, steel ingots, machine tools and automobiles, was greater in 1934, the second year of recovery, than in 1931, the second year of depression.

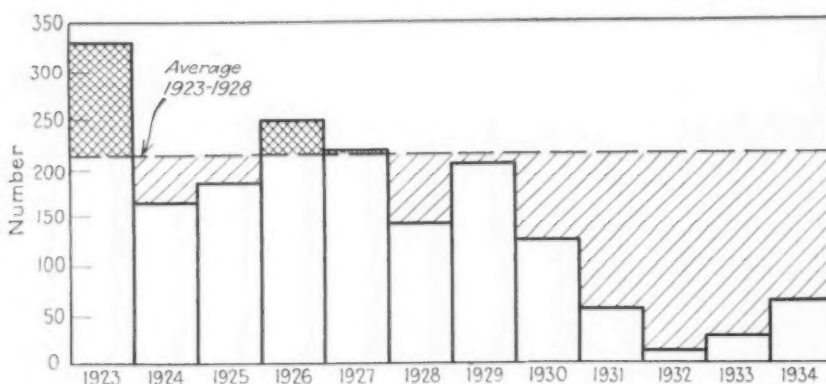
That 1935 will witness some further improvement in the durable goods industries can be safely predicted even at this early date, although the extent of recovery will depend largely upon factors outside the control of these industries or their customers. Durable goods, whether new factory buildings, machinery or equipment purchased by industry, or new houses, automobiles or oil burners bought by individuals, involve an investment of capital rather than a charge against current operating expense. These goods are paid for out of past savings in the form of corporate surpluses or individuals' bank accounts, or, more usually, by means of a loan to be repaid out of future savings. Purchase of capital goods, therefore, requires the existence of an adequate supply of what Grover Cleveland called "confident credit," implying confidence on the part of the borrower that he can repay his debt out of future profits or income and confidence on the part of the lender that he will be repaid what he loaned, not only in money but in purchasing power.

This assurance does not yet exist. Since new security issues have been negligible in amount, it is obvious that industry has made only necessitous purchases of capital goods during the past two years, and that these have been paid for chiefly out of existing corporate surpluses. Further substantial expansion of demand for industrial durable goods can not come without reasonable assurance of increased



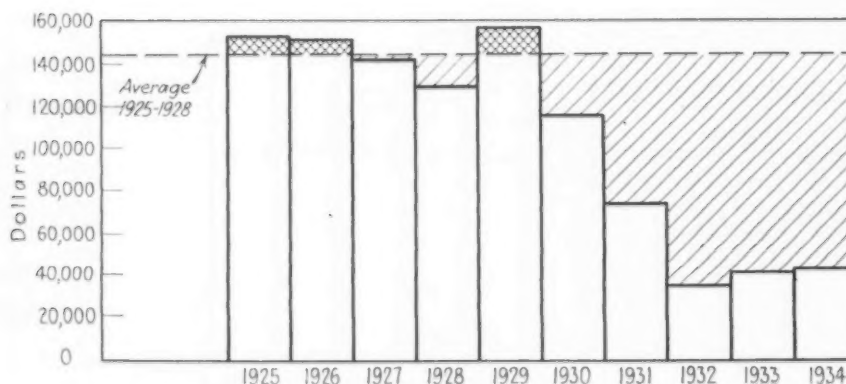
Industrial Electric Trucks and Tractors—Shipments
(Monthly Averages)

Compiled by the U. S. Bureau of the Census, representing shipments of electric industrial trucks and tractors by nine leading manufacturers comprising the greater part of the industry.



Industrial Electric Locomotives—Shipments
(Quarterly Averages)

Compiled from quarterly reports to the U. S. Bureau of the Census, from nine manufacturers comprising practically the entire industry.

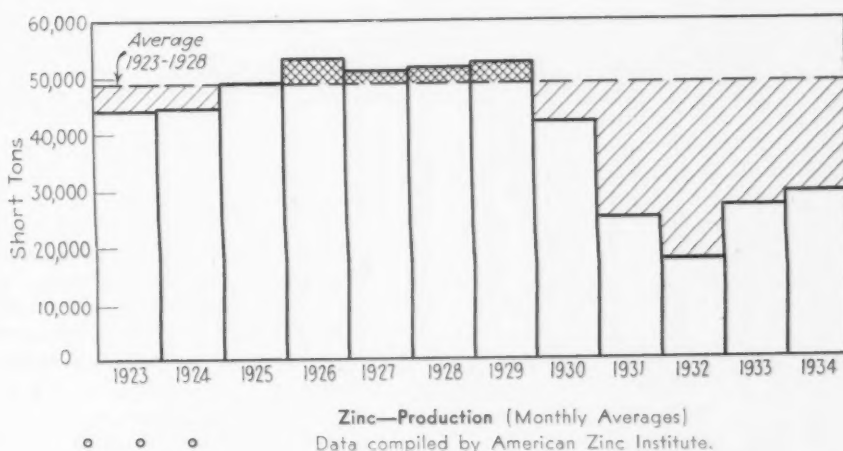
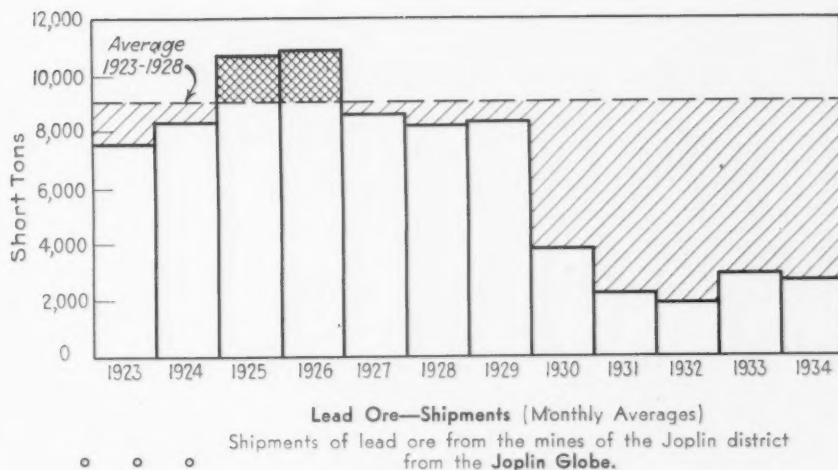


Electrical Porcelain, Special—Shipments (Monthly Averages)

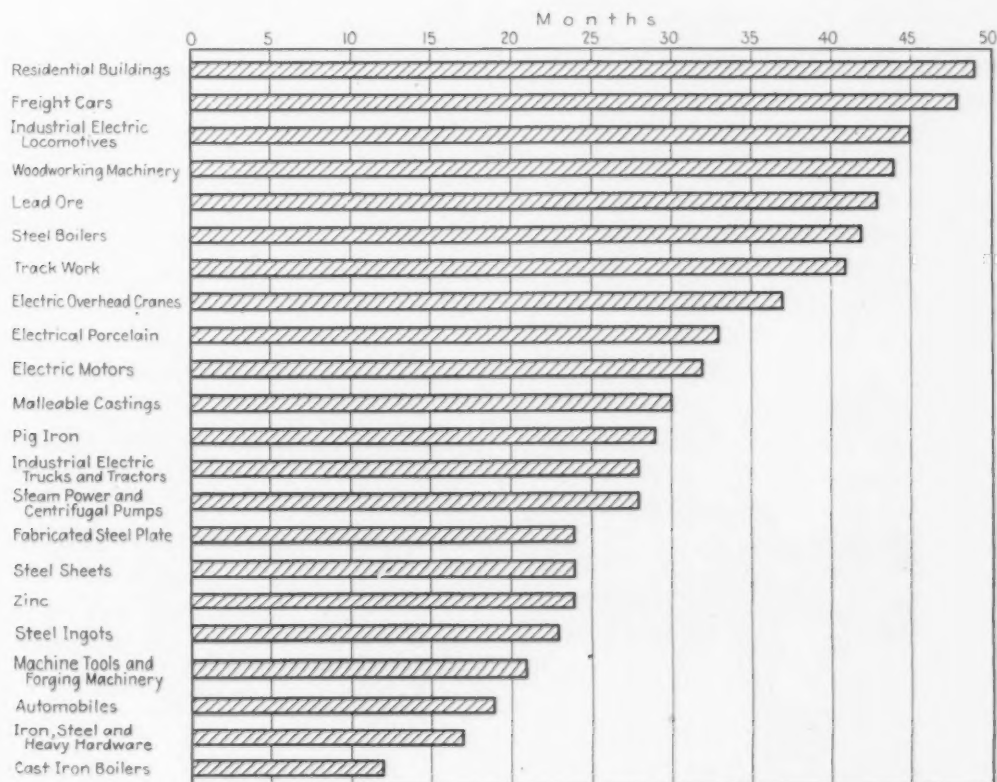
Compiled by the National Electrical Manufacturers Association. Statistics on special porcelain are from firms producing about 15 to 20 per cent of all special porcelain.

profits and ready access to the investment markets. Although the outlook for profits is still clouded with such uncertainties as possible increases in labor costs arising from further reduction in hours of work, the threat of costly strikes in the major industries, and the probability of heavier taxes, the situation is not entirely discouraging in view of the marked improvement which has occurred during the past two years. Furthermore, the difficulties involved in obtaining new capital appear to have been alleviated by the announcement by the S.E.C. of its revised and greatly simplified form for the registration of new securities.

From the standpoint of the creditor the outlook is less encouraging. Although the dollar has been kept stable at 59 per cent of its former parity during the past year, there is no assurance that the pressure of inflationist groups in Congress will not force a further devaluation or that the passage of drastic inflationary measures over the President's veto may not eventually result in uncontrolled depreciation of the currency. Such a possibility is not lessened by the fact that after five successive annual deficits the Federal budget will again fail to balance by \$4,000,000,000 in the 1936 fiscal year.



NUMBER of months' operations required to fill existing shortages.



Grinding Operations on Acme-Gridley Parts

By FRED B. JACOBS

A TYPICAL Acme-Gridley machine has over 1000 separate parts and weighs anywhere from four to ten tons, depending of course on the size. As the machine operates at high speed it must be constructed with extreme care for it is a generating unit in every sense of the word and therefore it cannot duplicate accuracy that is not built into it. Accuracy is assured through finishing various parts by precision grinding of the highest order and several of the more important grinding operations are illustrated and described in this article.

What might be termed the heart

of a typical four-spindle Acme-Gridley automatic is shown in Fig. 1, which illustrates the tool slide and spindle arrangement. Practically all the grinding operations described herewith pertain to this important element of the machine.

An excellent example of a heavy part which must be finished accurately is given in Fig. 2. This unit is a spindle carrier assembled with its shaft, the entire assembly weighing approximately one-half ton. Three diameters on the spindle and the outer diameter of the carrier are finished by grinding. The ground spindle dimensions are $3\frac{15}{16}$ in. diameter x $2\frac{1}{2}$ in. long, $4\frac{1}{2}$ in. diameter x 3 in. long and 5 in. diameter x 30 in. long. The ground dimensions on the carrier

are $22\frac{3}{8}$ in. in diameter and $8\frac{1}{2}$ and $4\frac{1}{4}$ in. long respectively. The spindle carrier is semi-steel, $3\frac{1}{2}$ per cent nickel, and the shaft is alloy steel.

The machine upon which the unit is mounted is a Norton gap grinder capable of accommodating work 96 in. long, 18 in. in diameter over the bed and 30 in. in diameter in the gap. It will be noted that the gap accommodates the carrier. The wheel used is Alundum, 24 in. in diameter, $3\frac{3}{8}$ in. face, 24 combination grit, K grade. The wheel is operated at a surface speed of 5500 ft. per min. The work speed is 25 ft. per min. About 0.020 in. is allowed for grinding. As the work is held and rotated between centers and the spindle and carrier finished at one setting of the work,

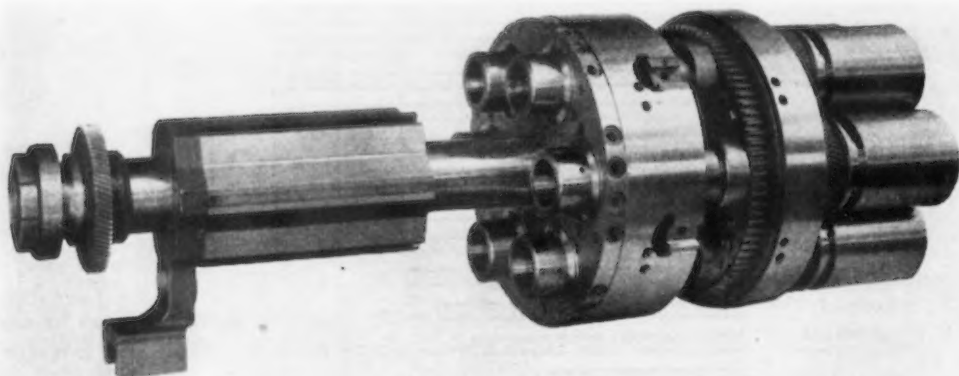
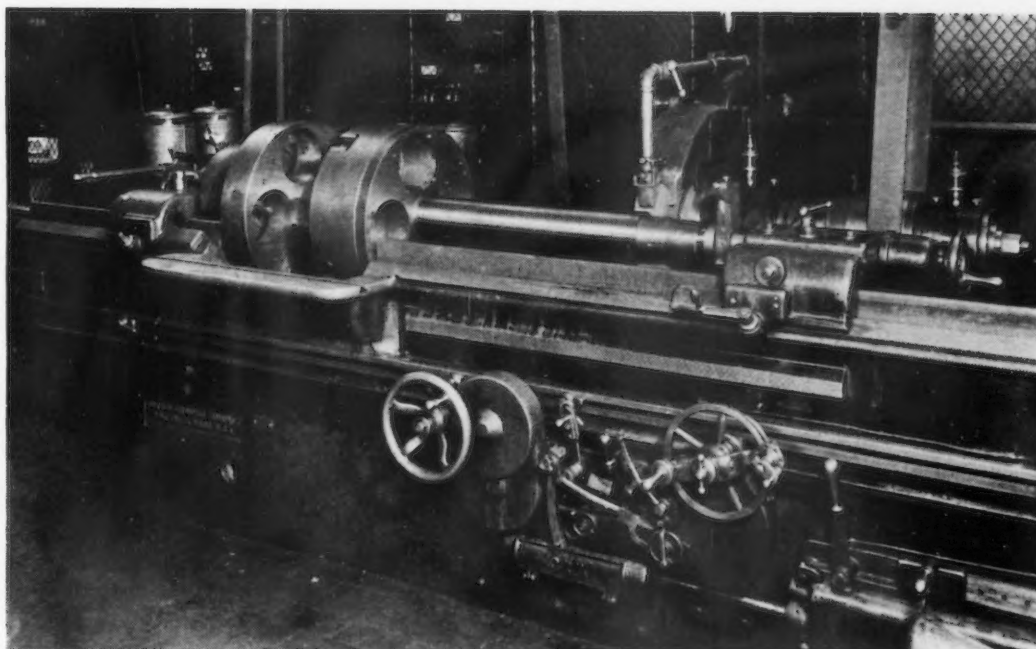


FIG. 1 — Grinding plays a large part in finishing the tool slide and spindle components. These constitute the "heart" of the automatic.

FIG. 2—Finishing three diameters on the spindle shaft and the periphery of the spindle carrier. This assembly weighs one-half ton.



it is obvious that all diameters will be concentric, which is the result demanded.

In Fig. 3 is shown the spindle carrier mounted for grinding the holes that accommodate the spindle assemblies. The spindle carrier in question is for a six-spindle machine to take 1-in. bar stock. This carrier is 17½ in. in diameter and 15½ in. long. The holes are ground through both the front and

back sections and are 5 in. in diameter. The work is held and rotated in a special fixture, the radial distances between the holes being controlled by a large index plate shown in the background. Due to the large diameter of the index plate, error in spacing the holes in the carrier can be held within small limits. The index plate is an aluminum-alloy casting, 50 in. in diameter with six accu-

ately spaced holes provided with hardened, ground and lapped steel bushings to accommodate the index pin. As the illustration shows, the base of the fixture has a taper slide so that an accurate vertical adjustment is possible.

The grinder used is a Heald planetary grinder fitted with a Carborundum wheel 4 in. in diameter, ¾ in. face, 303 grit, S grade. The wheel is operated at a per-

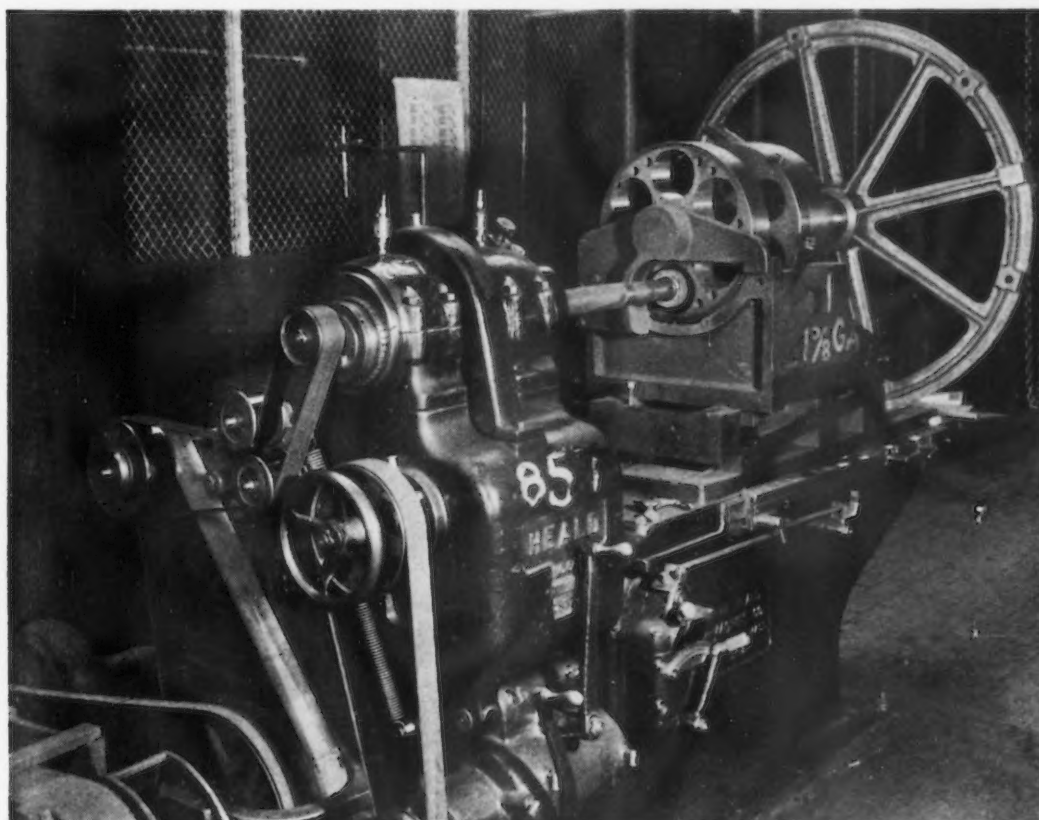
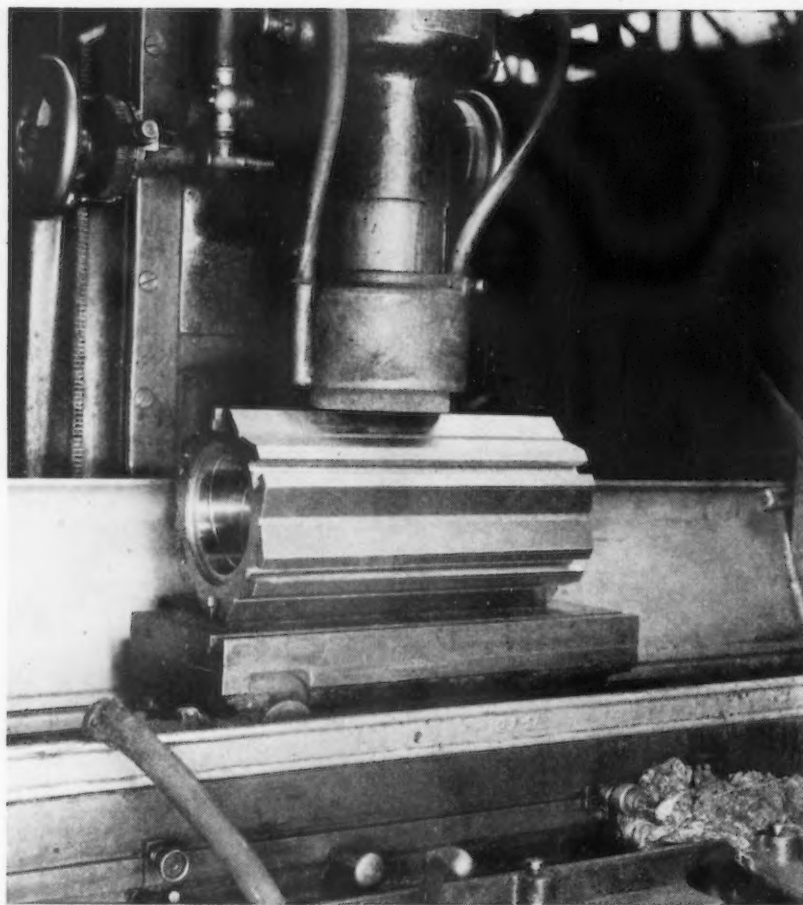
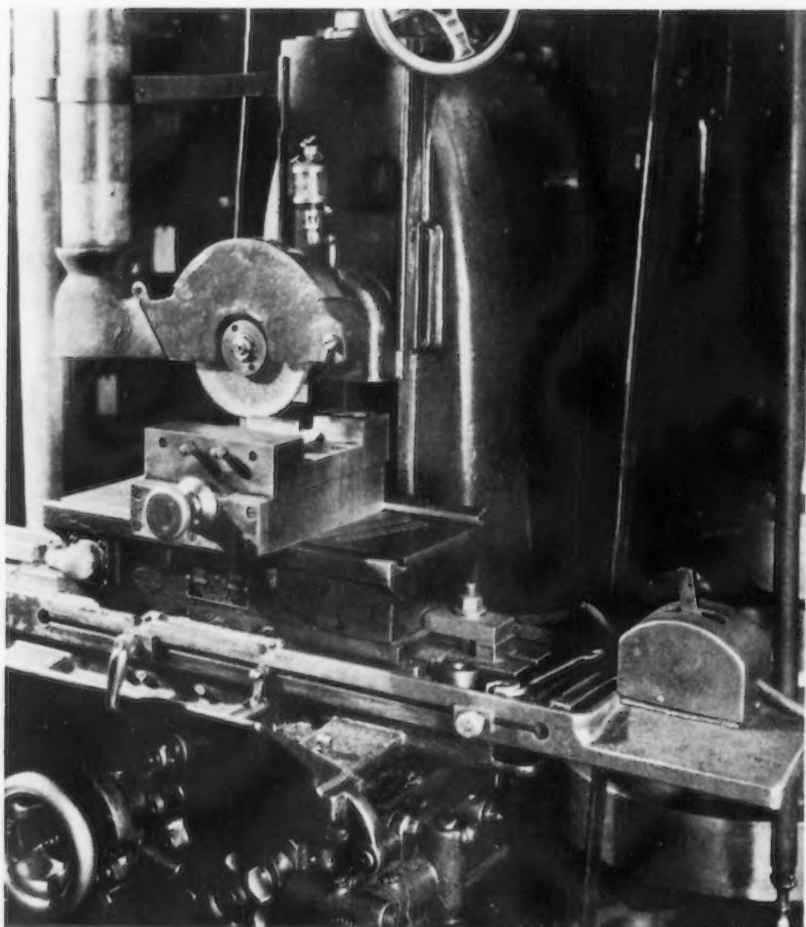


FIG. 3—The set-up for grinding spindle seats in the carrier. Indexing wheel is mounted directly upon the spindle carrier shaft.



ipheral speed of 5000 ft. per min. while the eccentric or planetary speed of the wheel is 48 r.p.m. Accuracy of the hole diameter, radial distance between the holes, and the dimension from the center of the work to the axis of each ground hole is held to a tolerance of 0.0005 in. In many instances it has been impossible to detect any error in the ground part. However, a limit of 0.0005 in. is extremely close for work of this size and character.

Referring again to Fig. 1, on the front part of the spindle carrier are shown two locking blocks let into slots machined to accommodate them. The locking blocks receive the lock bolt which secures the spindle carrier in position as it is automatically indexed from station to station. The number of locking blocks on the carrier of course depends on the number of spindles, there being one block for each spindle. It is obvious that the locking blocks must be spaced very accurately and this is accomplished by the grinding operation shown in Fig. 4. This operation assures accuracy of the spindle carrier location in each position to within 0.0001 in. To understand the principle involved it must be borne in mind that one side of the lock bolt where it enters the locking block is tapered at an angle of 10 degrees while the other side is straight. Thus by grinding away a slight amount from the locking block, the lock bolt location can be altered so that a high degree of accuracy in the location is possible.

Referring to Fig. 4, the locking block is held in a special fixture and clamped in place by two square-head screws which are shown at the front of the fixture. The fixture base is in two parts, one sliding over the other, the movement being controlled by a screw. At the front of the fixture is shown a knob for turning the screw and the dial graduated to give close settings. Thus it is possible to control the amount removed by grinding within close limits.

ABOVE AT LEFT

FIG. 4—Accuracy to within 0.0001 in. in indexing is secured by taper grinding one side of each locking block.

AT LEFT

FIG. 5—Grinding the top surfaces of the T-slots on the main tool slide.

The fixture is held on a B. and W. magnetic chuck which is located on the platen of a No. 2 Brown & Sharpe surface grinder. The wheel used in this operation is a taper-face cup, 6 in. in diameter, 1½ in. face, Alundum, 1946 grit, H grade. It is operated at an approximate peripheral speed at the rim of 4000 ft. per min., which is ample for an operation of this kind. By this simple grinding method extreme accuracy of the lock bolt location in each locking block is assured.

The part arranged for grinding in Fig. 5 is a main tool slide. This unit is made from a high-carbon steel forging, heat treated, and provided with bronze bushings. The slide illustrated is 14 in. long and 9 in. in diameter. It slides over the spindle carrier stem as shown in Fig. 1, being actuated by a cam. The tool holders locate over the tapered portions of the slide at each side of the T-slots. The operation shown in Fig. 5 consists of grinding the flat surfaces over the T-slots. As the illustration shows, the work is held on a magnetic chuck. The machine is an abrasive machine tool grinder fitted with a cup wheel 6 in. in diameter, 4 in. deep, 60 grit, M grade. The wheel has a surface speed at the rim of 6000 ft. per min. Care must be exercised in this operation to have each finished surface equidistant from the axis of the part as these ground surfaces are used for locating the piece for the next operation.

In Fig. 6 is shown the tool slide arranged for grinding the beveled surfaces at the sides of the flat surfaces previously ground. As the illustration shows, the work is held in a special angular fixture, locating from two flat surfaces previously ground. The part is held in place by a clamp at each end, while the fixture is located on a magnetic chuck.

This machine is a Norton surface grinder capable of taking work 9 ft. long and 18 in. wide. The machine is fitted with three magnetic chucks placed end to end. The wheel is Alundum, 14 in. in diameter, 6 in. face, 24 combination grit, K grade, and is operated at a surface speed of 4000 ft. per min. Great care must be exercised in this operation to make sure that the ground surfaces are equidistant from the axis which assure interchangeability of the tool holders in

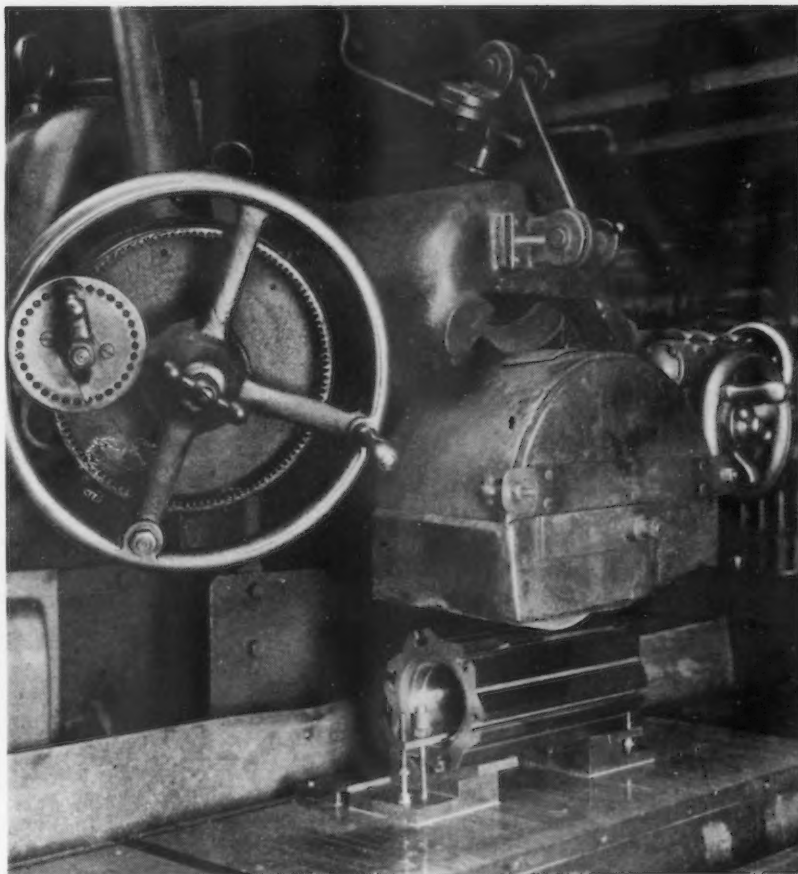
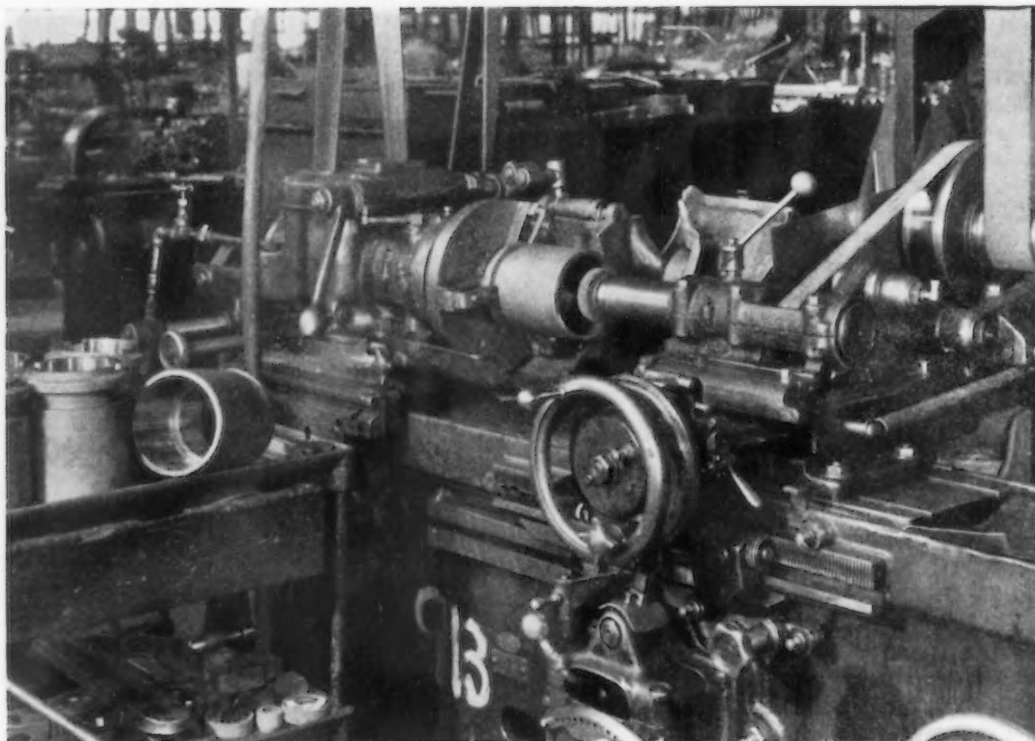


FIG. 6—Grinding the beveled surfaces of the T-slots on the main tool slide.



FIG. 7—Finishing interior surface of case-hardened clutch gear.





AT LEFT

FIG. 8—Internal grinding of finger hole spool,

BELOW

FIG. 9—An example of grinding to finish of long and slender work. The job is a drive shaft, 101 in. long.

the completed machine. The limits on this work are 0.0005 in. The machine in question is in almost constant use as it is employed for finishing flat surfaces on a diversity of parts, large and small. Due to its chuck range, 9 ft. x 18 in., it can accommodate a number of parts at one setting.

The operation illustrated in Fig. 7 consists of finishing a case-hardened machinery-steel clutch gear. The hole to be finished is $3\frac{1}{8}$ in. in diameter and $1\frac{1}{4}$ in. deep. In this operation the part is faced, the internal diameter finished and the bottom of the hole faced at one setting of the work. The piece is located by wringing it onto a stub arbor which locates in the head-stock spindle.

This machine is a Heald internal grinder fitted with an Alundum cup wheel, $2\frac{1}{2}$ in. in diameter, $1\frac{1}{2}$ in. face, 60 grit, I grade. The wheel operates at a spindle speed of 10,000 r.p.m. while the work speed is 50 r.p.m. By grinding the three surfaces at one setting of the work, the bottom and outer surfaces are parallel and square with the bore, which is an essential requirement.

Referring again to Fig. 1, the parts shown at the extreme right are finger holder spools. They are made of chrome-nickel steel, heat treated and contain the mechanism for operating the collets that grip

the bar stock. The groove on the spool engages with a shoe in the feeding position and the shoe releases the mechanism to permit the stock to be fed forward against a stop. Fig. 8 shows how the spools

are ground internally. This particular spool has two internal diameters as plainly shown in one of the spools on the work table by the machine. The smaller portion is $4\frac{1}{8}$ in. in diameter and $2\frac{1}{2}$ in.



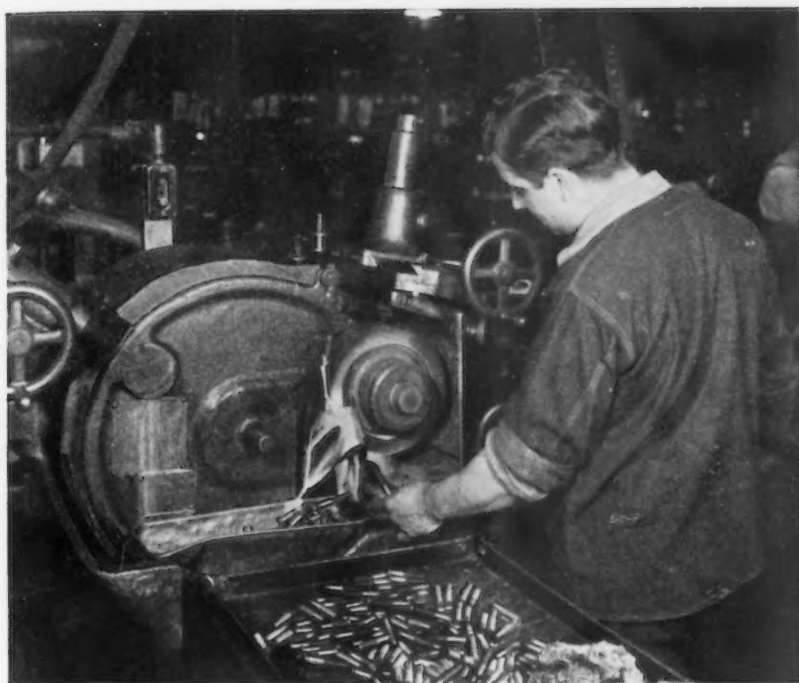


FIG. 10—Centerless grinding is used in a number of instances. This shows the operation applied to cam roll studs.

long. The remainder of the spool has an internal diameter of $4\frac{13}{16}$ in., this portion being $8\frac{1}{4}$ in. long. Due to its construction, this piece lends itself readily to locating for grinding as it is held back by three straps locating in the groove which brings the back of the work against three locating surfaces. After the work is positioned approximately, the operator trues it up carefully by means of a dial indicator. Then the strap bolts are set up firmly enough to hold the work securely for grinding.

This machine is a No. 52 Heald internal grinder fitted with an Alundum wheel, 4 in. in diameter, 1 in. face, 50 grit, I grade, operated at a surface speed of 5000 ft. per min. The work speed is 50 r.p.m. Both internal diameters are finished at one setting of the work which assures their being concentric and the tolerance is 0.0005 in., which is close for an internal job of this size.

A good example of comparatively long, slender work finished by grinding is shown in Fig. 9. This part is a drive shaft 101 in. long overall, the largest diameter being $2\frac{1}{2}$ in. The other dimensions finished by grinding are $1\frac{1}{4}$ in. diameter x 2 in. long, 2 in. diameter x 4 in. long, $2\frac{1}{4}$ in. diameter x $1\frac{1}{4}$ in. long, 2 in. diameter x $1\frac{25}{32}$ in. long and $1\frac{1}{4}$ in. diameter x $1\frac{13}{32}$ in. long.

In finishing this shaft as many diameters as possible are ground at one setting of the work. The work is held between centers and driven by a dog at one end in the usual way. Also the work is supported by two backrests, one of which shows in the illustration. The machine used is a Norton cylindrical grinder capable of accommodating work 18 in. in diameter and 96 in. long. In this case the machine is utilized at an over ca-

capacity since the work is 101 in. long. As the illustration shows, the tailstock projects from the ways for about one-quarter of its length. The wheel used is Alundum, 20 in. in diameter, 2 in. face, 24 combination grit, L grade, operated at a surface speed of approximately 5500 ft. per min. About 0.020 in. is allowed for grinding and the grinding tolerances are 0.0005 in. In many instances, however, the finished shafts do not vary 0.0002 in. from the desired size.

Centerless grinding is employed for finishing a number of parts. In Fig. 10, the operation consists of finishing cam roll studs. These are case hardened and have a ground portion $\frac{1}{2}$ in. diameter x $1\frac{1}{4}$ in. long. The operation is shoulder grinding, that is the work is ground up to a shoulder by locating it on the work slide and bringing the feed and grinding wheels together by means of a hand-actuated lever. The machine used is a Cincinnati centerless grinder fitted with an Alundum wheel, 20 in. in diameter, 4 in. face, 1960 grit, L grade, operated at a surface speed of 5000 ft. per min.

Repair parts for old style machines involve the manufacture of aluminum bronze bushings which preceded the anti-friction bearings used today. These parts must be ground very accurately. A setup for internal grinding a spindle bushing is shown in Fig. 11. The work is held in a V and, as the

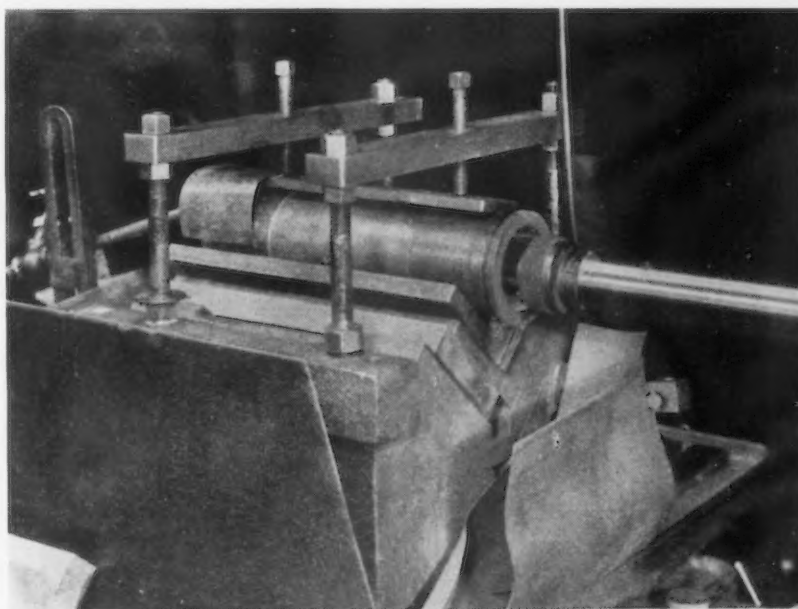


FIG. 11—Internal grinding an aluminum bronze bushing used in an old style automatic.

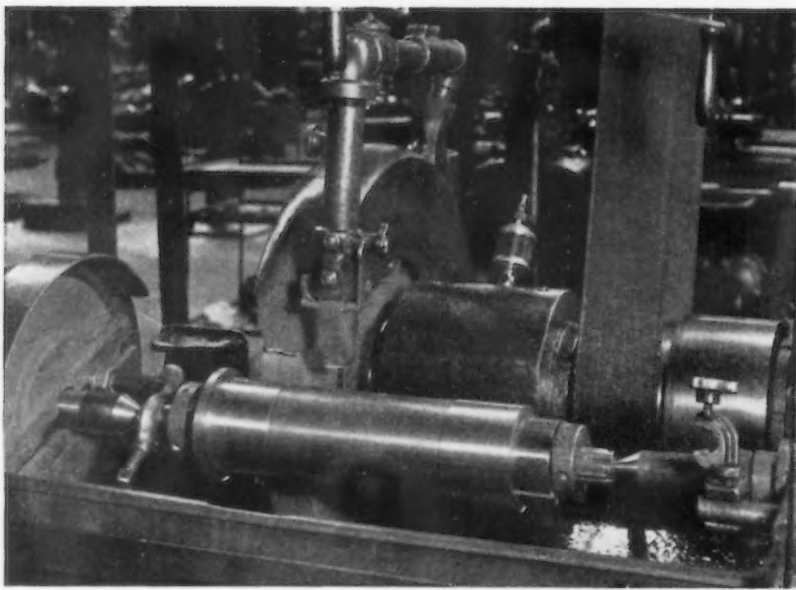


FIG. 12—External grinding of the aluminum bronze bushing shown in Fig. 11.

illustration shows, the V is built up with parallels so that the approximate correct center locating is assured. An approximate location, that is with 0.001 in. is satisfactory because the outer diameter is finished by locating from the inner ground diameter. The work is held in place by means of the clamps shown, it being understood that care must be exercised in set-

ting down the screws so as not to distort the work. However, a comparatively light pressure is sufficient to hold the work in place securely enough for this operation.

The machine used is a Heald No.

50 planetary-type grinder fitted with an Alundum wheel, $2\frac{1}{2}$ in. in diameter, $\frac{3}{4}$ in. face, 46 grit, H grade, operated at a surface speed of 5000 ft. per min. The planetary speed of the wheel is about 60 r.p.m. The work shown in place is $12\frac{7}{32}$ in. long with a $2\frac{3}{4}$ in. hole. This is a good example of planetary internal grinding and it assures a round, straight hole.

The operation of grinding the outer diameter of an old style spindle bushing is shown in Fig. 12. This part has two surfaces finished by grinding each $4\frac{3}{8}$ in. in diameter and 3 in. long. The work is located on an expanding arbor and driven by a dog at one end. The machine used is a Norton cylindrical grinder fitted with an Alundum wheel, 20 in. in diameter, 2 in. face, 24 combination grit, K grade, operated at an approximate speed of 5500 surface ft. per min. The work speed is 60 r.p.m. This is an accurate operation as the tolerance for variation from the given size is 0.0005 in. and the same limit applies to concentricity between the hole and the outer diameter.

FIG. 14—Surfacing tool slides of old style units.

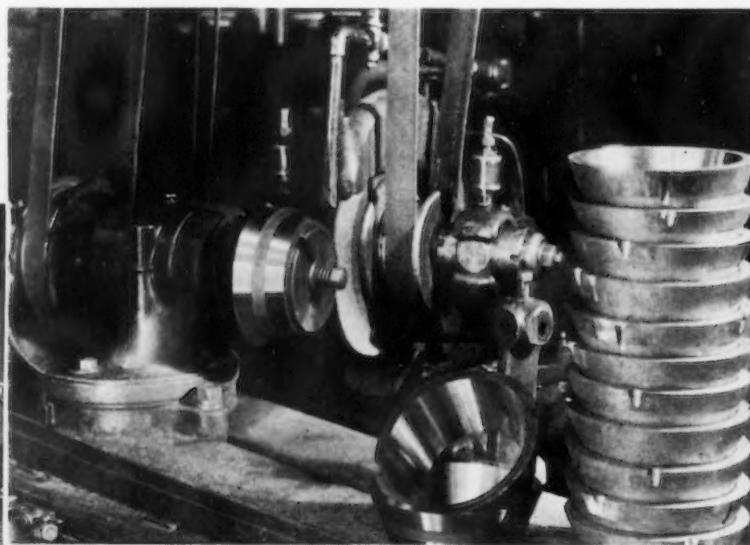
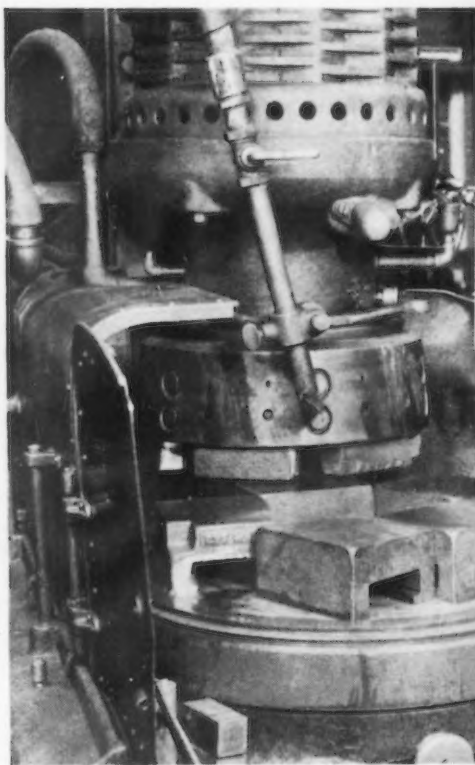


FIG. 13—Grinding external diameter of tapered bearing.

In Fig. 13 is shown a Brown & Sharpe No. 2 universal grinder arranged for finishing the outer diameter of old style taper bearings. These units are machinery steel, case hardened, and are $5\frac{1}{2}$ in. in diameter at the large end with a 20-deg. taper at each side. The inner diameter is ground previously on an internal grinder. The

(CONCLUDED ON PAGE 82)

Surface Finish and How It Can Be Measured And Specified

By E. J. ABBOTT

Research Physicist, University of
Michigan

of an instrument for tracing over the surface with a very sharp diamond point, and magnifying and recording optically the movements of the point to obtain an enlarged record of the profile of the surface. The instrument has been described in a previous article.² In the pres-

ent paper the sizes and shapes of surface irregularities are described briefly on the basis of information obtained with the Profilograph, after which various methods of rating roughness are considered in terms of practical problems of finish.

Characteristics of Surface Finishes

LIKE all practical problems, surface finish is complicated by a number of factors, but it seems certain that the most important are the size and shape of the irregularities which are the roughness of the surface.

Several means have been suggested for rating surfaces, and these will be discussed presently, but to the author's knowledge there is only one method of measurement which gives essential data on the sizes and shapes of the irregularities in everyday units, namely, the inch. This instrument is called the Profilograph¹ because it enables one to make enlarged records of surface profiles. Briefly, it consists

FIG. 1 shows profilograms of the surface irregularities of three typical finishes to scale. The outstanding feature of all three surfaces is clearly the extreme blunt-

ness of the irregularities. In each case the width of a hill or valley is from 10 to 50 times its height, and this seems to be a general characteristic of all surfaces measured. The instrument is easily capable of recording much sharper curves, and since there is no trace of such irregularities, it is concluded that the essential irregularities of surfaces are very dull. This fact should be borne in mind when talking about "bending over peaks," etc. This dullness is perhaps more easily understood when one thinks of the difficulty of maintaining tools which are sharp in terms of tenths of a thousandth.

A second feature of machined surfaces is the wide range in the size of the irregularities. On rough boring operations and the like, the profile may have a depth of 0.004 to 0.005 in., while on finely finished parts such as piston pins, gages, etc., the irregularities may be of the order of five millionths (0.000005 in.), a factor of nearly

¹ Developed in the physics laboratory of the University of Michigan, on a project undertaken for the Timken Roller Bearing Co., by the Department of Engineering Research. Additional development of the instrument was made in connection with a project for the Ingersoll Milling Machine Co.

² "New Profilograph Measures Roughness of Finely Finished and Ground Surfaces," by E. J. Abbott and F. A. Firestone, *Automotive Industries*, Aug. 19, 1933, page 204.

SIZES and shapes of surface irregularities, as determined by means of the Profilograph, are described briefly and various suggested methods of rating surface finish are reviewed in this paper, which was presented by Mr. Abbott at the annual meeting of the Society of Automotive Engineers, held in Detroit last week. The Profilograph was illustrated and described in an article on "The Measurement and Diagnosis of Gear Noise," by Mr. Abbott and Prof. F. A. Firestone in *THE IRON AGE* of Dec. 20, 1934, page 10.

1000 to 1 between coarse roughing and fine finishing operations.

Extreme Range in Shape of Profiles

A third feature of surfaces is the extreme range in the shape of the profiles. This probably is to be expected from the ease with which various operations can be recognized by inspection of the surfaces. On many surfaces no two of the irregularities are alike, and the size may vary by a factor of 10 to 1 in a distance of a few thousandths of an inch of profile. For this reason records of the type shown in

of operation. In fact, most operations can be recognized almost as easily from the profilograms as from the specimens. Figs. 2 and 3 show profilograms of several typical surfaces.

Specification of Roughness

It would be desirable if the roughness of a surface could be specified by a single number so that a surface could be rated as a No. 6 or No. 10 finish. At first thought it seems that a number giving the height of the profile would serve this purpose, but an inspection of the profiles of actual

Medial Number.—The height between the 25 per cent and 75 per cent bearing area.

Valley Number.—The height between the 75 per cent and 98 per cent bearing area.

All three numbers are given in inches, preferably millionths of an inch for convenience. The 2 per cent and 98 per cent limits were chosen to minimize the effect of a single prominent irregularity. This specification takes no account of the horizontal spacing of the irregularities. If it is desired to do this, it appears that the number of times the profile curve crosses the 50 per cent bearing area line in a given distance would be a good rating. This method of specification, and the reasons underlying it, are described more fully in a previous paper.³

Surface Waviness

In addition to the finely spaced (a few tenths of a thousandth up to a few thousandths of an inch) irregularities which we have termed the "roughness," many surfaces exhibit another type of irregularity which we have called "waviness." In general, the roughness and waviness of a surface are of the same order of vertical dimension (up to 100 millionths inch for finishing operations), but the horizontal spacing of the waviness is much greater—of the order of tenths of inches, or more. Fig. 4 shows some typical examples of waviness. The roughness is usually related to "tool marks," while waviness is due to "feed marks," "chatter" and other causes.

Obviously, if one is to actually realize the benefits of a smooth surface, the waviness must be small enough that the bearing area is determined by the roughness rather than the waviness. It appears that waviness is important on many familiar operations. At present it seems that the best way to specify waviness is to give the height and spacing of the waves. For example, 10 millionths inch high, and 1/16-in. spacing.

Practical Methods Of Rating Finish

WHILE the method of measuring and specifying finish just outlined apparently leaves little to be desired concerning data on the

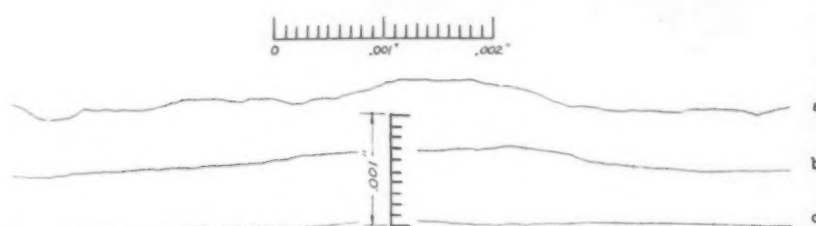


FIG. 1—Profilograms of surfaces in true proportion showing bluntness of irregularities. Magnification 1000X. The profilogram a is of a rough hone surface; b, one feed mark of diamond bore; and c, finish hone.

Fig. 1 are of slight practical value because they cover too small a length of specimen. This difficulty is overcome by gearing down the recording drum of the Profilograph so that the profile is compressed horizontally by a factor of perhaps 50 or so. This makes all the irregularities appear 50 times as sharp as they are, but, since they are initially so dull, it is still possible to distinguish the individual wiggles. It has been found that about 1/4 in. of trace is suitable to obtain a good rating on most surfaces, and on fine finish operations a still shorter trace is sufficient.

On some surfaces the profile curves are very irregular; on others they are very regular. On some the profiles are essentially flat with occasional scratches, while others are essentially flat with occasional peaks. On most machined surfaces, valleys are larger and more prominent than peaks, but on some the peaks and valleys are almost identical in size and shape. Of course, the irregularities are more closely spaced on the finer finishes, and peculiarities of form exist in almost every different type

surfaces proves that such is not the case. From the standpoint of wear, a surface which is essentially flat with occasional scratches is obviously far superior to one with prominent peaks, or even one which is of saw-tooth contour, even though they may all have the same total depth of profile.

After examination of the profilograms of practically all of the usual machining and finishing operations, it was decided that the best approach to specification is the rate at which the bearing area of the surface increases as the upper part of the profile is removed. Measurements were made of the increase of bearing area with depth on a number of profilograms, and the following specification devised on the basis of these measurements. It was found that most of the peaks on a surface are removed when the bearing area is 25 per cent, and that when the bearing area is 75 per cent, only the deeper valleys remain. Accordingly, a surface is defined in terms of three heights, as follows:

Peak Number.—The height between the 2 per cent and 25 per cent bearing area.

³ "Specifying Surface Quality," by E. J. Abbott and F. A. Firestone, *Mechanical Engineering*, September, 1933, page 569.

size and dimensions of the irregularities, it has one drawback, namely, time (that is, cost). While additional development will certainly reduce the cost of records from the present value of several dollars each on a laboratory basis, it appears to the author that the minute dimensions involved demand a delicacy of instrument, adjustment and manipulation which precludes its immediate application to routine factory inspection. With this in mind, it is proposed to review briefly the various methods of rating finish which have been suggested, together with a brief statement of the advantages and disadvantages of each.

Microscopic Examination.—Ordinary microscopic examination is of slight practical use because one is primarily interested in the height of the irregularities, while the microscope gives a plan view, and hence does not yield definite numerical values. If the magnification is great enough to bring out millionths of an inch, the field of view is so small that usually only a part of an irregularity can be viewed at once. Small depth of focus is another drawback. By using different lighting, one can obtain almost any kind of picture he wishes. Hence this method is of little use in settling arguments.

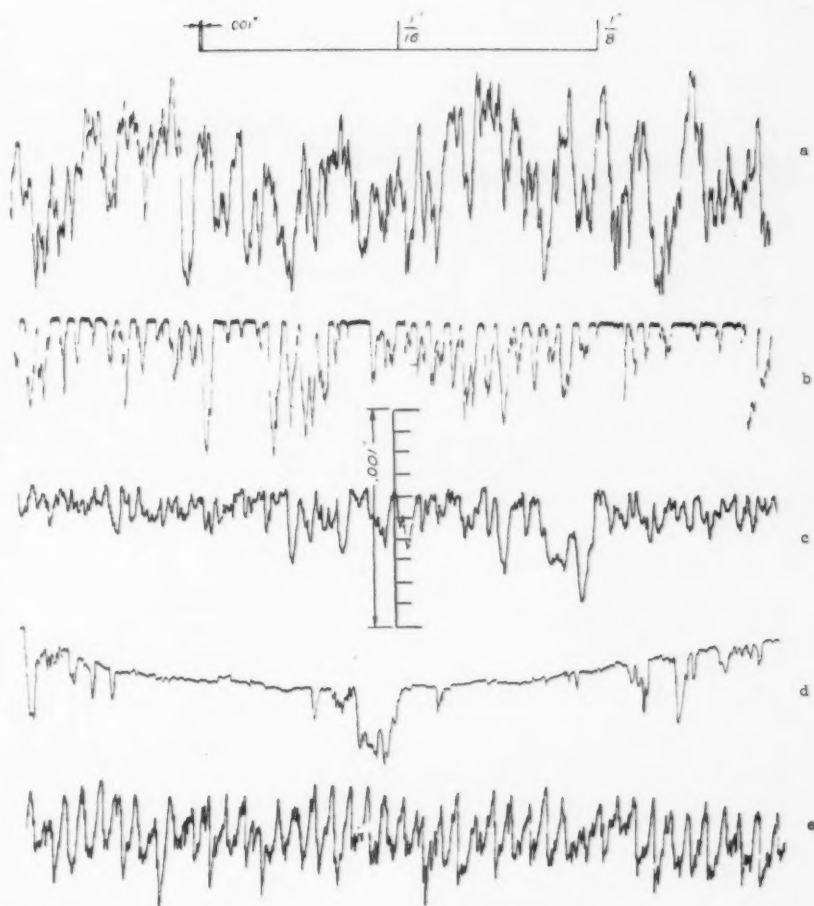
Profile Microscopic Examination.

—A method has been devised for illuminating a small area of surface and viewing it at essentially grazing incidence with a microscope to obtain a profile view.⁴ This is a very simple method for comparatively rough surfaces, such as boring and the like, but is not sensitive enough for finishing operations where smoothness is really a factor.

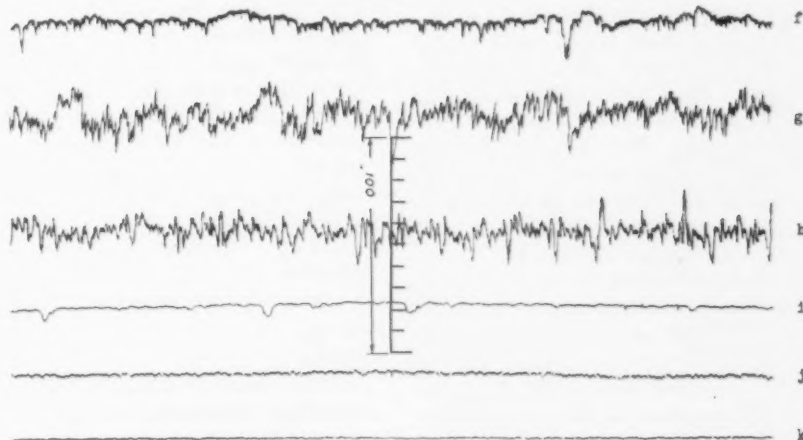
Profile Section Method.—If a specimen is carefully copper plated, cut so as to expose a profile of the surface, and the cut carefully polished, the profile can be examined microscopically, and photomicrographs made if desired.⁵ It is believed that this is the best method of studying the details of the shape of any single irregularity, assuming that the shape is properly preserved in the preparation of the specimen. If one uses,

⁴Über ein neues Mikroskop zur Oberflächenprüfung," by von G. Schmaltz. Sonderabdruck auf Zeiss Nachrichten. Heft 7, Juli 1934.

⁵"Microscopical Examination of Cross-Section of Surfaces," by C. B. Sawyer. Appendix 1 to paper cited in Note 6.



FIGS. 2 and 3—Profilograms of several typical surfaces showing differences in size and shape of irregularities. Magnification: Vertical, 2000X; horizontal, 30X; the record covering about 1/4 in. of the specimens. These records illustrate the sort of profiles obtained, and are not intended to indicate the relative smoothness obtainable with a given operation. The one at a is of a bore in cast iron; b, bore followed by partial hone; c, reamed; d, worn automobile cylinder; e, "diamond" bore; f, burnished; g, ground; h, honed; i, lapped; j, ground; and k, honed.



say, 1000X to measure the vertical dimensions, he must use several yards of records to obtain a suitable average. This method is so laborious that it seems reasonably sure that it will be used only in special laboratory experiments.

Pencil-Lead Method.—An attempt has been made to rate the roughness of surfaces by the rate

at which a pencil lead is worn away when it is drawn over the surface at a certain speed under a given pressure. Usually the lead is mounted on the end of a dial gage so that the wear in thousandths is indicated directly. The author has never had an opportunity to compare readings made by this method with profilograms of the surfaces

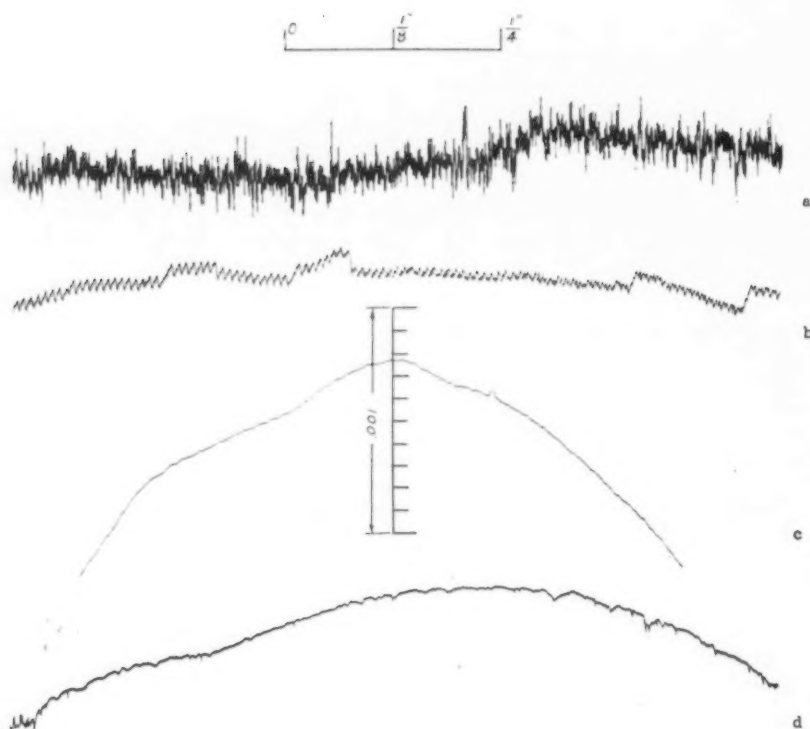


FIG. 4—Profilograms of typical surfaces showing waviness as well as roughness. Magnification: Vertical, 2000X; horizontal, 8X; the record covering about 1 in. of the specimens. The record *a* is a surface operation; *b*, bore; *c*, small waves about 0.00005 in. high by 1/10 in. spacing on a smooth, slightly curved surface; and *d*, worn automobile cylinder.

in question, and hence has no definite information. I have been informed that, while it seems to give a fairly consistent rating, it leaves much to be desired.

Electrical Pick-Up Method.—Several investigators have drawn a phonograph pick-up across a surface, and used the generated voltage as a measure of the roughness.⁶ The voltage was measured by means of an amplifier and electric meter. This single value obviously cannot give all the information which can be obtained from profilograms, but the author is of the opinion that this is the practical instrumental method for routine inspection. However, some of the outfits have been assembled without a proper appreciation of the electrical factors involved, and it is my opinion that such instruments should be regarded as special-purpose devices, developed for a specific inspection after comparisons with profilograms, and suitable adjustments in the electrical circuits to assure proper agreement. They should not be used for

general rating purposes without check.

Visual Comparison with Profilographed Standards.—The old "eye and fingernail" method of judging finish often leads one far astray if he is trying to compare different types of operation, as, for example, ground, lapped, and honed surfaces. It cannot be depended upon for this purpose. On the other hand, if one has several specimens of a given operation, as, for example, grinding, of varying degrees of roughness, they can be unerringly placed in the correct order of roughness by ordinary inspection. This immediately suggests a method of checking finish which is both economical and accurate.

When one is making preliminary decisions regarding the relative finish obtained by different operations, or by different machinery, or is setting up limits, or wishes to settle an argument, the answer is profilograms of selected specimens. For routine inspection, visual comparison is made between the production finishes, and the standard specimens of the particular operation in question.

Means are now available so that surface finishes can be measured

and specified in terms of the dimensions and shapes of the irregularities, which are the roughness and waviness of the surface. Sufficient profilograms have been made to indicate something of the complexity of the problem, and to prove the necessity of more than one number for specifying roughness so that account can be taken of the character of the surface, as well as the size of the irregularities. A set of three numbers has been devised which appears to be sufficient for specifying most finishes in use today.

For routine checking of finish it appears that visual comparison with standard specimens, and special-purpose electrical meters are most promising. In both cases, they should be based on, and correlated with, profilograms, and the Profilograph be used to settle all arguments. Additional development will also improve the Profilograph.

Two Electric Furnaces Are Installed

THE Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has installed an additional electric furnace, which is rated at three tons per hour on batch cold melting practice. This foundry specializes largely in electric iron camshafts, crankshafts, cylinder blocks, centrifuge brake drums, etc. The Pittsburgh Lectromelt Furnace Corp. has four other units in this foundry. Three of these are rated at 1000 lb. per hr. and the fourth will melt 1½ tons per hr.

The Duraloy Co., New Cumberland, W. Va., is now installing its third Lectromelt, a 500-lb. three-phase unit, which will be used for making special heat and corrosion resistant alloys.

Chicago A.S.M. Well Attended

THE Chicago chapter of the American Society of Metals celebrated its annual national president's night at a regular meeting held on Jan. 10. The guest and speaker of the evening was Judge John P. McGoorty, who presented an address concerning the control of crime. B. F. Shepherd, national president of the society, also gave a brief talk on the influence of the society and the help it is to the industry.

⁶ "A Survey of Surface Quality of Standards and Tolerance Cost Based on 1924-30 Precision Grinding Practice," by R. E. W. Harrison. *Transactions, A.S.M.E.* (1931). Paper No. MSP-53-12.

Rustless Steel Production Approaches Peak Level

By T. W. LIPPERT

The Iron Age, New York

THE depression is practically over for producers of corrosion and heat-resisting steels. In 1934, total output of such alloys amounted to 43,695 tons, compared with 54,949 tons in the peak year of 1930 and 23,832 tons in 1932, which was the least active 12 months experienced by the industry.

From these figures, it is evident that the rustless (or stainless) steel business has considerable industrial significance. Although the tonnage is only a small percentage of total alloy steel output, the monetary return is considerably larger than for an equal tonnage of low-alloy steels.

Alloys belonging to the chromium and chromium-nickel groups were introduced commercially about 15 years ago for the making of cutlery. It was soon discovered how to reduce the carbon in these

alloys to a point where they could be more readily rolled and fabricated. In quick order, the high-chrome compositions and chrome irons appeared, after which the 18-8 and other chrome-nickel combinations were offered to consumers. A great many types of steels (or nickel base alloys) are now in regular commercial production, and a number of these compositions are practically indispensable for various corrosion and heat-resisting applications.

Production Statistics Now Available

In order to keep the trade informed as to the status of this phase of the steel industry, THE IRON AGE has conducted annual production surveys since 1929. These statistics are not obtainable through any other medium.

Prior to 1933, only about 90 per cent of the country's rustless steel ingot production was reported, and the totals in Table I for the years 1929 to 1932 are weighted accordingly. For 1933 and 1934, however, every licensed maker of ingots but one cooperated in the survey. This one producer's output has been es-

timated closely from other allied data obtained by THE IRON AGE.

In Table I, total yearly production of ingots for each of the last six years is shown, as well as a complete breakdown as to analyses. These same data are pictorially presented in Fig. 1. The figures show that the austenitic 18-8 grade continues in first place, with pearlitic steels of the 12 to 14 chromium type second in importance, and ferritic 16 to 18 chromium alloys occupying third position. This relation is a reversal of production in 1931 and 1932, during which years the 12 to 14 per cent chromium alloys were in third place, from a tonnage standpoint.

The greater output of 12 to 14 per cent chromium steels probably resulted from increased miscellaneous demand and cannot be attributed to a particular consuming industry. Much of the 16 to 18 chromium steel, however, goes to the automotive industry in the form of strips or sheets.

In Table I a large tonnage was necessarily lumped under the general caption "All Other (Cr. or Cr-Ni)." A good portion of this tonnage is in the 4 to 6 per cent

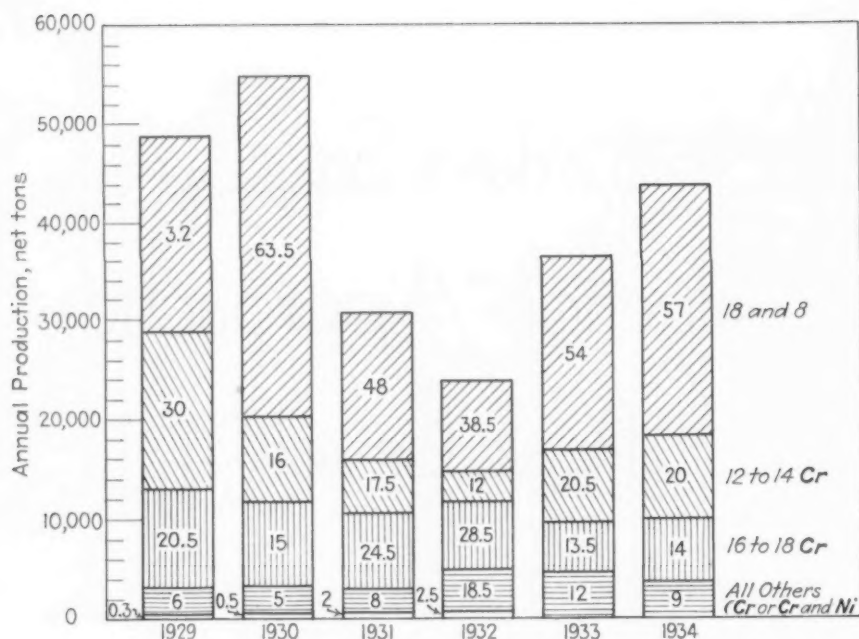


Fig. 1—The 1934 production of rustless steel ingots shows an 83 per cent advance over the 1932 level, which was a low point. This graph gives the annual production of corrosion and heat resisting ingots and castings and per cent distributions by analysis for the past six years. The percentages shown as blank, prior to 1933, were not allocated as to analysis.

chromium group, but the exact proportion is unknown. In future surveys an effort will be made to break up the "all other" group in order that the distribution be more complete.

Larger Sheet Production

A breakdown for finished products as to type and composition was completed for 1933 and 1934. These data are shown in Table II. The figures give a fair indication of what products and compositions the consumers are demanding. However, they do not represent a full coverage of the industry, inasmuch as licensed mills sell many thousands of tons of ingots and semi-finished steels yearly to innumerable plants which fabricate these materials into consumers' products. It is practically impossible to obtain full statistical data from these plants, many of which handle only a few tons yearly. However, the distribution in Table II does represent about 75 per cent of the total output of the country, and the total distribution should conform fairly closely.

The predominance of sheets over other products is to be expected, when the large demands for sheets from the railroad, building and exterior decorating industries are considered. But what is really surprising is the large production of bars, which is second and almost

equal to the sheet tonnages. A large proportion of bars is used for fittings on cars, etc., and also in distilling and refining equipment. In the bar group are also listed small rolled sections, which are subsequently cut into many pieces for use in small machines and consumer products. Practically all of the bars listed in Table II are less than 3 in. in diameter, as large bars are usually forged.

Tubular goods occupy third place. Much of the demand for these products comes from the brewing, distilling and refining industries.

Also the decorative arts use sizable quantities, and the tonnage going into modern furniture is increasing each year. Tubing is about the oldest product made from corrosion and heat-resisting alloys. Boiler tubes of 0.30 carbon and 12 per cent chromium were in commercial production as long ago as in 1922.

Strip production is in fourth place, despite the general assumption that strip is next to sheets in general usage. Most of the strip tonnage shown in Table II represents cold-rolled material. Building and decorating are two large outlets of strip, and usually cold-rolling is necessary to secure a surface sufficiently fine for decoration or polishing. Drop forgings, forged bars, etc., are included under forgings.

More Castings Produced

As in previous years, the surveys of foundry production of rustless and heat-resisting alloys for 1933 and 1934 were not completely successful. All but seven of the licensed foundries furnished figures as to yearly output and distribution by analysis, and with actual production data from all the other foundries available, it was possible to arrive at the estimated output of the unknown seven on the basis of their capacity to produce rustless and heat-resisting castings.

It can be seen in Table I that the 1934 output of castings was higher than for either 1932 or 1933, and was almost equal to the 1931 production. The 18-8 grade has the largest tonnage of the reported analyses. However, the

TABLE I PRODUCTION OF RUSTLESS OR STAINLESS STEELS IN THE UNITED STATES (1929-1934) (Net Tons)						
	1929	1930	1931	1932	1933	1934
Ingots:						
18 and 8.....	21,074	34,867	14,740	9,209	19,620	24,818
12 to 14 per cent Cr (approx.)	14,552	8,821	5,397	2,900	7,401	8,658
16 to 18 per cent Cr (approx.)	10,127	7,995	7,483	6,751	4,969	6,242
All other (Cr or Cr and Ni)...	2,950	2,792	2,438	4,312	4,262	3,977
Not allocated.....	187	474	622	660
Total	48,890	54,949	30,680	23,832	36,252	43,695
Castings:						
18 and 8.....	83	271	225	401	668	915
12 to 14 per cent Cr (approx.)	15	15	29	23	36	164
16 to 18 per cent Cr (approx.)	37	96	192	237	225	86
All other (Cr or Cr and Ni)...	2,876	3,131	2,264	1,840	1,510	1,690
Not allocated.....	1,392	1,009	511	285	54	19
Total	4,403	4,522	3,221	2,786	2,493	2,874
Grand Total (Ingots and Castings)	53,293	59,471	33,901	26,618	38,745	46,569

tonnages grouped under the designation "all other" is large, amounting to about 60 per cent of the total castings produced.

It is known that much of the tonnage under the "all other" classification includes analyses such as 50 to 60 nickel and 12 to 18 chromium, 38 to 40 nickel and 18 to 20 chromium, and 12 to 15 nickel and 20 to 24 chromium. Also included are complex alloys with very high nickel contents, up to 20 per cent chromium, together with small amounts of silicon, iron, titanium, etc. In future surveys an attempt will be made to split up most of the "all other" tonnage of castings into several of these groups.

If general business in 1935 fulfills the expectations of most prophets, it is quite possible that the 1935 output of corrosion and heat-resisting ingots and castings will reach a new high level. However, it should be pointed out that chromium and chromium-nickel alloys are encountering increasing competitive pressure from low-alloy steels. For general building

TABLE II PRODUCTION OF RUSTLESS STEEL IN 1933 AND 1934 BY PRODUCT AND ANALYSIS (Net Tons)					
	Total All Grades (Net Tons)	18-8	12 to 14 Cr	16 to 18 Cr	All Others, Cr and Cr-Ni
Sheets:					
1933.....	9,953	6,617	1,472	1,628	236
1934.....	10,217	6,661	2,199	1,192	165
Bars:					
1933.....	8,228	3,375	1,769	2,099	985
1934.....	8,736	4,433	2,515	786	1,002
Tubular Goods:					
1933.....	4,144	726	492	48	2,878
1934.....	2,176	486	199	210	1,281
Strip:					
1933.....	1,370	318	222	819	11
1934.....	1,838	510	273	1,001	54
Plates:					
1933.....	838	620	128	52	38
1934.....	1,451	960	391	28	72
Forgings:					
1933.....	310	103	40	82	85
1934.....	280	78	26	84	92
Wire:					
1933.....	173	83	10	16	64
1934.....	92	39	18	4	31

purposes, railroad equipment, etc., the use of copper-bearing steels, copper-molybdenum steels, etc., is showing signs of growing. A larger

demand for these types of steels will displace some of the tonnage of the highly-alloyed Cr and Cr-Ni alloys.

LOOKING obliquely along the overflow edge of Arizona Spillway at Boulder Dam. The view shows the piers with 16 ft x 100 ft. drum gates in lowered position. These immense steel gates can be raised or lowered to decrease or increase the flow of water over the Spillway. Boulder Dam is now built to a height of 625 feet above bedrock, and will reach its final height of 726 ft., late in February, at which time it can begin to store water.



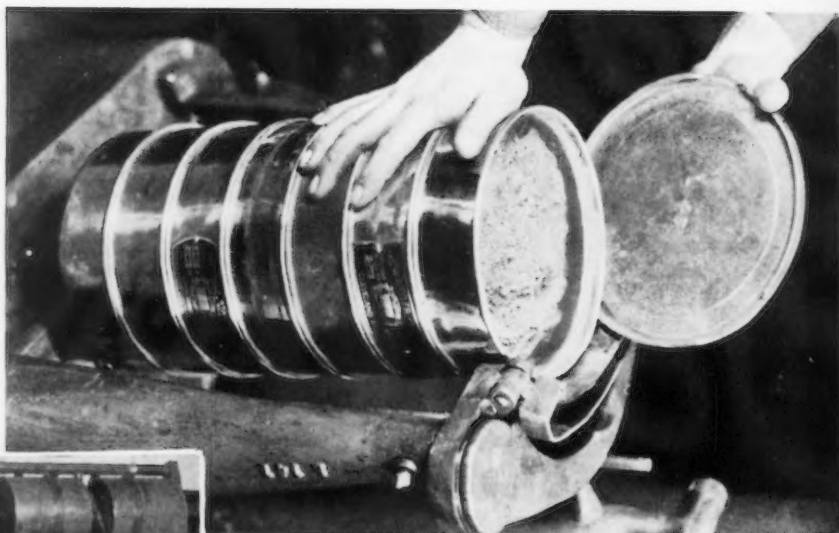
From Tungsten Powder To Finished Co



*A Pictorial Description of
the Carboloy Process of
Making Cemented Carbide
Tools*

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ABOVE
A "BOAT" of tungsten oxide and carbon starts on its way through the hydrogen furnace — to emerge later as tungsten carbide, the principal ingredient of cemented tungsten carbide. Upon completion of this step, the tungsten carbide is reduced to fine, chalk-like, powdered form preparatory to mixing with other ingredients.



ABOVE
TO reduce the powdered metals to the exact grain size required, the materials are sieved through a series of screens of progressively smaller mesh sizes. At left, the operator is placing the sieves in the mechanical agitator.

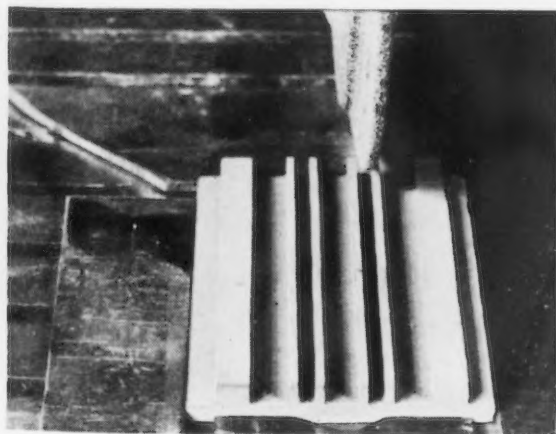


AT LEFT
AFTER the metals have been reduced to powdered form, the exact proportion of carbides and cementing agents are thoroughly mixed in ball mills. Illustration shows a typical "batch" of powdered material and the ball mill in which it is mixed.

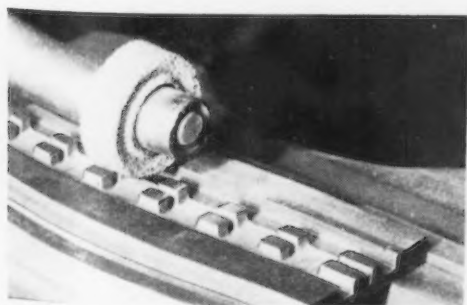
ed Carbide Tools



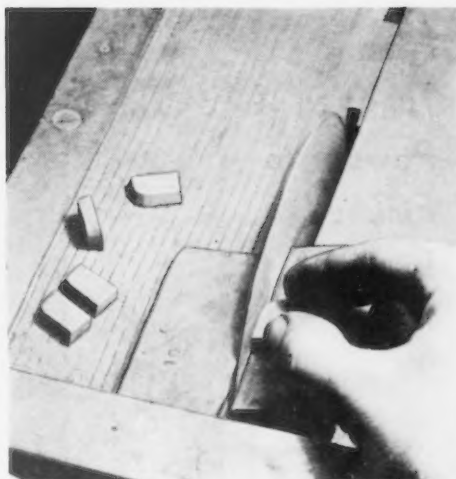
THE powdered material is placed in molds and compressed in hydraulic presses. Foreground shows (D) parts of a mold for a die nib, (A) the powder used, (B) the pressed nib (with hole shaped) and (C) the same-sized nib after hardening. About 14 per cent shrinkage occurs in hardening. The stack of ingots shows another shape pressed. Considerable labor is saved on subsequent operations by pressing to shape whenever possible. The operation immediately following the pressing is the first sintering, or heat treatment, to toughen the blank sufficiently for safe handling on shaping operations.



GRINDING grooves in a razor blade tempering plate in soft state. Size of piece approximately $1\frac{1}{2} \times 3$ in.



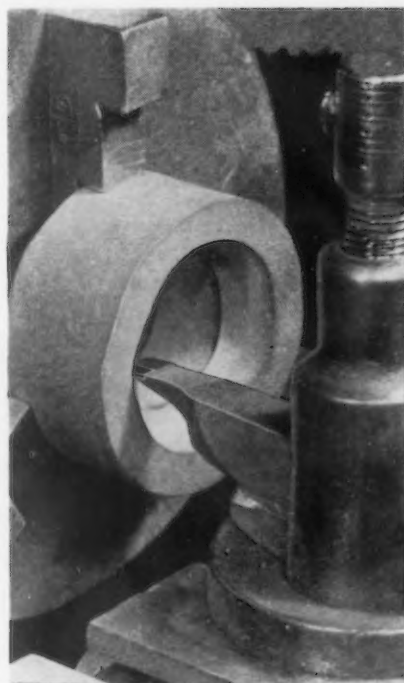
AT LEFT
SHAPING the "knobs" in a razor blade tempering plate in soft state. Size of piece about $1\frac{1}{2} \times 3$ in.



AT RIGHT
SAWING the simple-shaped tips out of ingots. Angles and radii are shaped on this tip in this operation. Tips are in pre-hardened, soft state.

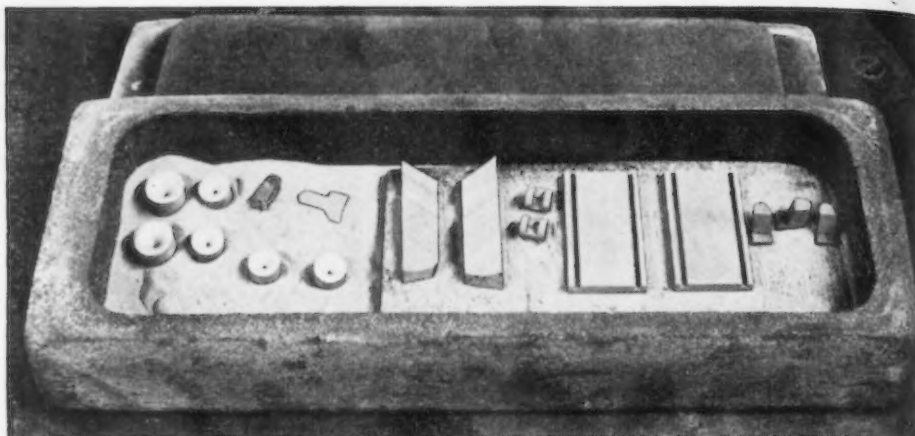


AT RIGHT
GRINDING teeth on a 1-in. diameter solid cemented tungsten carbide saw in the soft state.



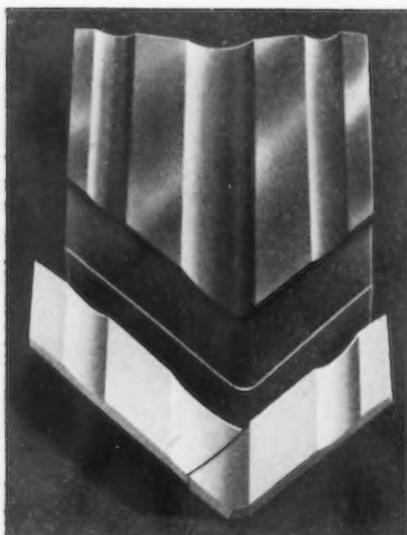
AT RIGHT
BORING a cemented tungsten carbide die nib for sheet drawing. Nib, outside diameter of which is about 2 in., is in soft state.

*From
Tungsten
Powder to
Finished
Carbide
Tools*



ABOVE

A "BOAT" containing shaped cemented tungsten carbide tips in soft state. These tips are covered and placed in hydrogen furnace for the final sintering (hardening) treatment.

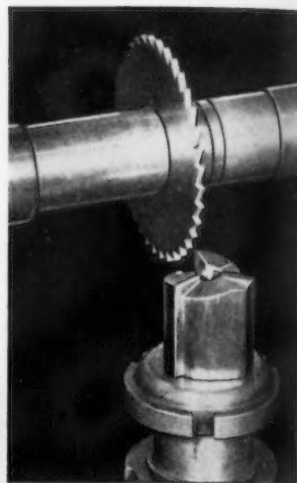
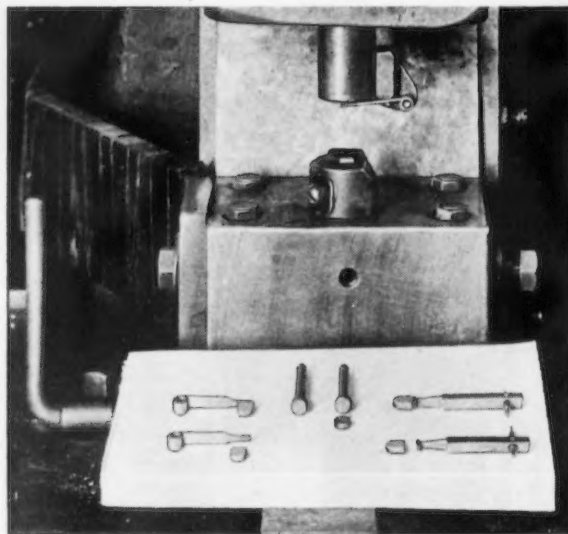


ABOVE

SHANK of a form tool recessed for cemented tungsten carbide tip. At the base of the shank is shown a pre-hardened cemented tungsten carbide tip shaped and ready for hardening. Anticipated shrinkage of tip is shown by comparing size of recess with size of soft tip.

BELOW

SPOT-WELDING is used occasionally to attach tips to shank. Illustration shows various types of cemented tungsten carbide contacts before and after welding.



ABOVE

MILLING the recesses in a cemented tungsten carbide spotfacer.



AT LEFT

THE wide variety of shapes in which cemented tungsten carbide tips may be made.

Continuous Controlled-Atmosphere Furnace Used to Harden Automobile Valve and Clutch Springs

BY F. L. PRENTISS

*Resident Editor, The Iron Age,
Cleveland*

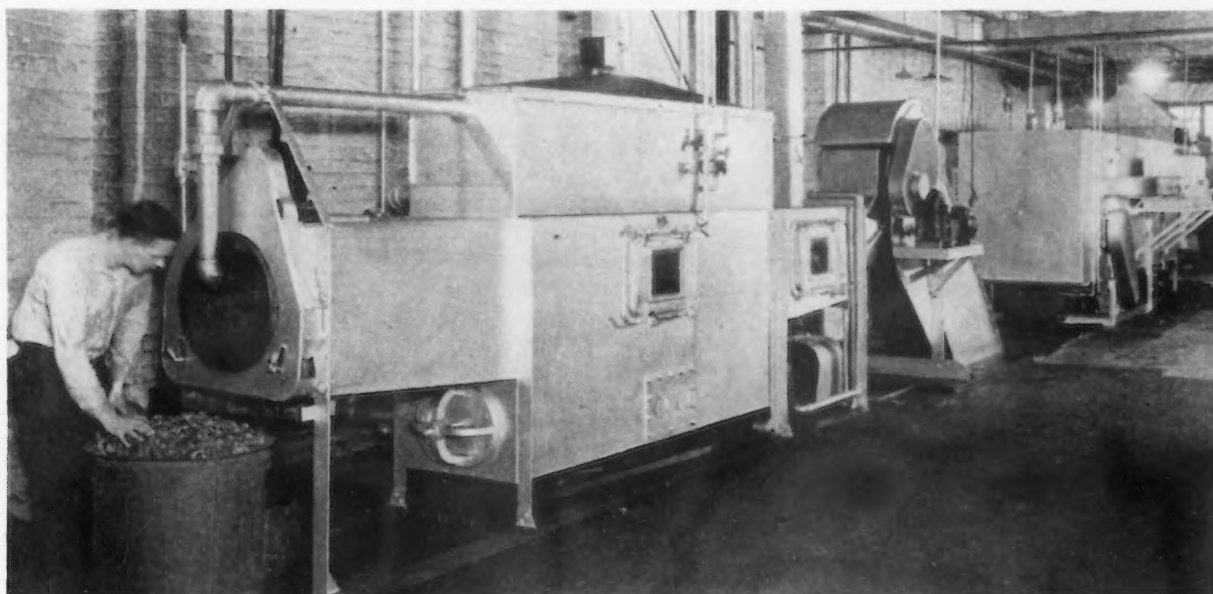
A CONTROLLED - ATMOSPHERE, continuous electric furnace is used for hardening high-grade automobile valve and clutch springs and other mechanical coil springs at the plant of the Cleveland Wire Spring Co., Cleveland. After hardening and before tempering in a drawing furnace, the springs are washed in a washing machine located directly back of the hardening

furnace. Washing removes the oil film left on the springs after quenching, so that they are perfectly clean when they go to the drawing furnace. A conveyor picks up the springs in the quenching tank at the discharge end of the hardening furnace and delivers them into the washing machine.

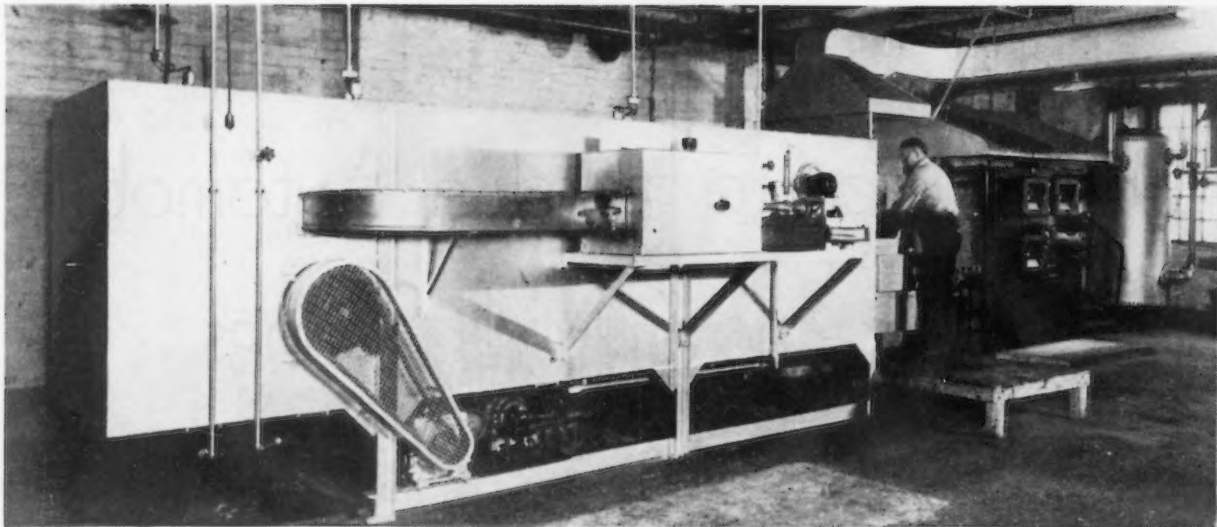
For making valve springs the company uses SAE 6150 chrome-vanadium spring steel or Swedish

valve spring wire which is approximately equivalent to SAE 1065. For high-grade springs surfaces of both grades of stock are inspected by taking cuts from both ends and deep-etching the pieces in hydrochloric acid. Most clutch springs are made from SAE 1360 carbon spring steel wire. Coiling the springs follows inspection.

Two methods are used in making springs. One is to coil the springs



SPRINGS are treated in the controlled-atmosphere hardening furnace at the right, and are dropped into a quenching tank under the floor, from which a conveyor delivers them into a rotary drum-type washing machine (in left foreground), which cleans them before they enter the drawing furnace. The springs are discharged from the washing machine into barrels which are loaded into the drawing furnace.



ANOTHER view of the continuous hardening furnace.

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from soft wire and then heat-treat. The other way is to heat-treat the wire before it is coiled and, after coiling, to give the springs a mild or bake-tempering at from 400 to 700 deg. F. to remove the coiling stresses. The chrome-vanadium springs are heat-treated after coiling as are some of the clutch springs, since the best springs are produced by this method. However, for some production jobs pre-tempered Swedish wire is used and the

springs are given the low-temperature heat treatment after they are coiled.

The springs are carried through the hardening furnace on a wire mesh conveyor belt. The attendant lays the springs in rows in a pan, shaped something like a dust pan, and slides them from the pan to the belt, which he always keeps completely loaded.

The furnace is divided into three

zones each of which is independently controlled by recording temperature control instruments connected to thermocouples in the furnace, which may be set to hold the temperature within prescribed limits.

The first furnace zone is a pre-heating zone. The temperature is brought to about 1400 deg. F. in the second zone and to 1500 deg. in the third or soaking zone, although there is some variation in the temperature depending on the

THE electric drawing furnaces in which springs are drawn to the proper temper after hardening and washing. Control equipment is in the background.

o o o



class of work. The time the springs are kept in the furnace is also subject to variation depending on the type of springs, this being regulated by controlling the speed of the conveyor belt. The temperature of this furnace, as well as the drawing furnace, is held to close limits, for, with variations in heat treating, springs would not be produced with a uniform compression. The heating elements are located in both the top and bottom of the furnace.

There are two of these hardening furnaces, having a connected load of 225 kw. Current is supplied from the main switchboard through three magnetic control switches at 230 volts. From the switches the power passes through transformers, being stepped down to 55 volts before entering the furnace.

Chute to Quenching Tank Is Water-Cooled

Each furnace is equipped with a combustion type of atmosphere controller which produces gas for maintaining the desired atmosphere in the furnace by the partial consumption of natural gas and its combination with air. The quality of the gas is regulated by controlling the mixture of gas and air, adjustments being made to produce a gas most suitable for the type

of springs that are being heat-treated.

At the discharge end of the furnace springs drop through a chute into an oil-quenching tank through which oil is circulated by centrifugal pump from a central oil cooling and storage system. The oil is kept at a uniform temperature of 100 to 110 deg. F. The zone around the chute through which the springs pass from the furnace to the quenching tank is water-cooled by a water jacket surrounding the chute in order to avoid any danger that might arise from excessive heating of the chute. The water that is heated in cooling the chute is utilized in supplying hot water for the washing machine. While it is not sufficient for that purpose, its use results in a reduction of the gas consumed for heating water for the washing machine.

Washing Machine Is of Rotary Drum Type

The washing machine is of the rotary drum type. The drum is approximately 20 ft. long and 30 in. in diameter. After the springs are cleaned with jets of hot water they pass into a drier section of the machine in which they are dried with forced air. On leaving the machine they are both dry and clean and, owing to the use of the

controlled atmosphere furnace, they have a minimum amount of scale.

The hardened springs are discharged from the washing machine into barrels holding 150 to 200 lb. of work, and these barrels are loaded into one of two Leeds & Northrup Homo-type drawing furnaces rated at 39 kw. each. These furnaces are equipped with automatic temperature control instruments. Drawing temperature ranges from 600 to 900 deg. F. depending on the type of spring. The drawing furnaces are provided with a ventilating system consisting of hoods over the furnaces connecting to exhaust pipes, although as the washing has left no oil to be burned off during drawing, fumes are not much in evidence during the tempering operation.

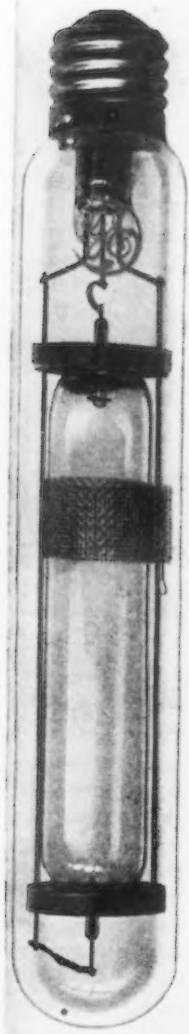
Springs made of pre-tempered wire are bake-tempered in a large chamber-type furnace.

After heat treating, the springs are compressed to remove any initial set and the ends are ground flat in automatic grinding machines. Then they are tested for load and squareness. Following testing most of the springs are steel-blasted in tumbling barrels to remove grinding dust and any scale that may have been formed. As a preventive against rust, the clean springs are then blued in a Homo furnace.



If you had wanted to take a bath in Jerusalem 2000 years ago, you would have had to find the key to this lock in order to have got in. It is one of the oldest locks in the world, was mounted on the door of a public bath, perhaps to keep the men out on ladies' days. Charles Courtney, its owner, will present this and other antiques to the Smithsonian Institution.

An Arrangement of High Intensity Me



THIS high intensity mercury vapor lamp is emphasized by its makers, the General Electric Vapor Lamp Co., Hoboken, N. J., as a new approach to an industrial, so-called, "white light."



THIS view illustrates the avoidance of glare and the elimination of excessive contrasts between light and shadow in the high-bay machine shop of the Tietjen & Lang Dry Dock Co., Hoboken, N. J.

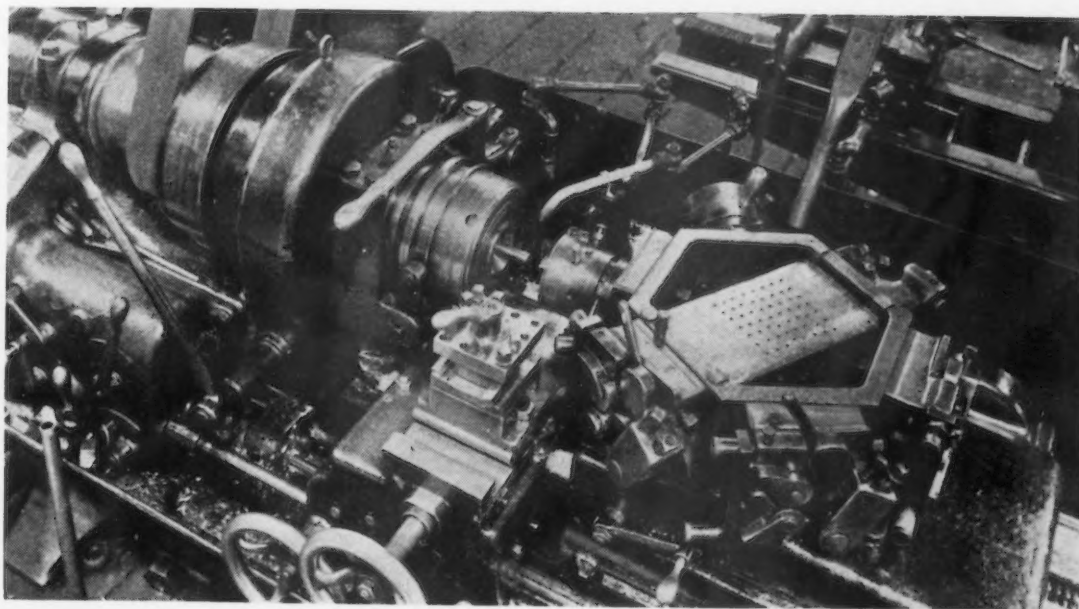


THE enlarged insert shows a turned and bored cylinder, taken from the two wooden horses, in its position 24 ft. below the high intensity lights. The clearness of details within shadow areas is noteworthy.

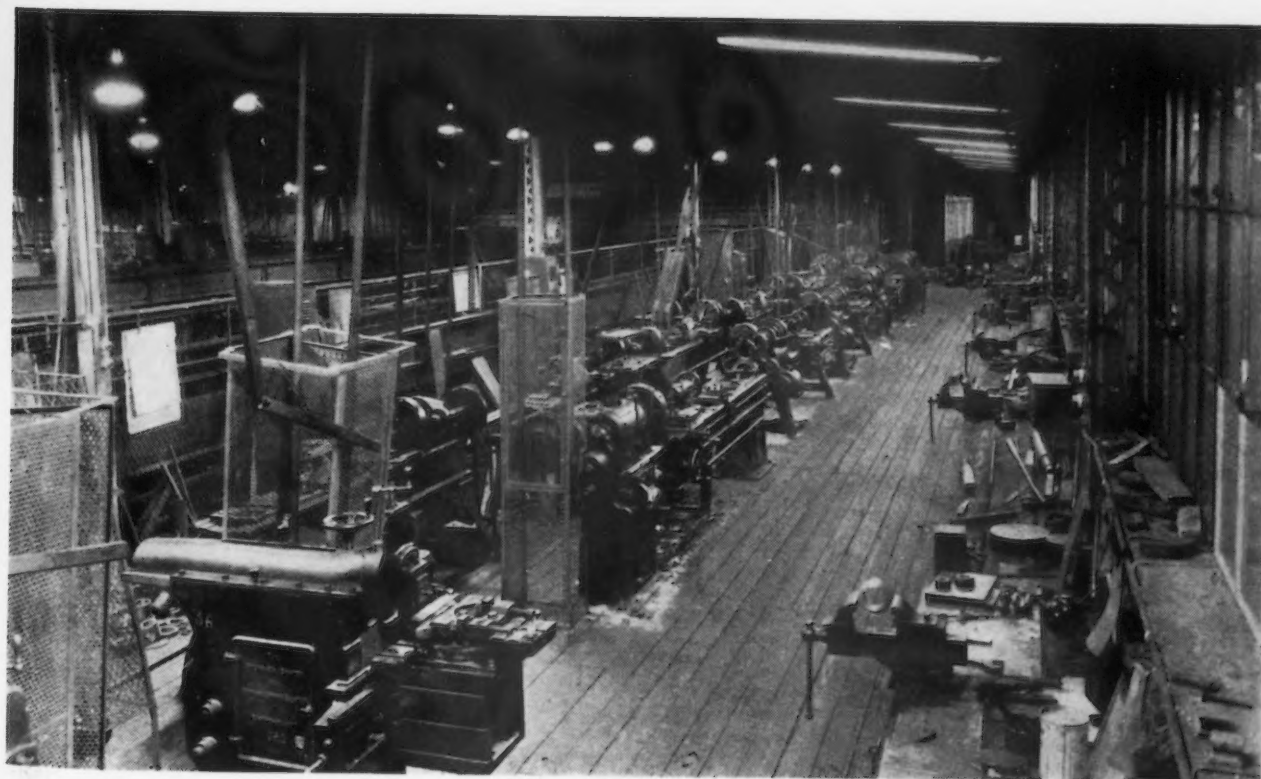
Mercury Vapor Lamps for High-Bay Lighting



THE evenness and efficiency of light spread over this machine and extending to tooling details, and even to chips, provides a very comfortable lack of eye strain and greatly increases operating convenience, both factors in the human element of shop mechanics.



ADDITIONALLY for balcony lighting (high bay at left) Cooper Hewitt lamps are used. The effectiveness of the combination, as photographically recorded, would seem to justify the slogan—"Better than daylight."



Hydraulic Snag Grinding Machine

Uses Air Generated Oil Pressure

HEAVY-DUTY grinding machines designed to quickly and thoroughly snag gates and risers from manganese steel and gray iron castings are offered by Kling Brothers Engineering Works, 1300 North Kostner Avenue, Chicago. The equipment is pictured on page 40.

The work is fastened to a T-slotted horizontal work-table which travels, under hydraulic power, parallel to the face of the wheel. The wheel is operated by hydraulic power in a vertical plane.

The feed of the work against the wheel is accomplished manually. A special feature of the design is the use of compressed air as the means of building up pressure on oil. This air, taken at 80 lb. or over per sq. in. from the shop line, eliminates the use of oil pumps, accumulators, etc. The use of compressed air gives quick response to all demands and all advantages of hydraulic power are retained.

The grinder consists essentially of a cast iron frame bed with machined ways for a work-table. Bolted to this bed is a hollow column with ways machined vertically for a motor carriage, which slides up and down the column, with vertical travel of 14 in. The motor is rated at 30 hp. and it has a synchronous speed of 900 r.p.m. Mounted directly on the motor shaft is the wheel, which in this case was furnished by the Macklin Co., Jackson, Mich. It measures 40 in. in diameter, 5-in. face and 12-in. bore. The speed at the surface is 9300 ft. per min. The motor is of inclosed, air-cooled type. Coolant water is piped to the work and is drained from the bottom of the wheel guard to a settling basin from which it is recirculated. The radial part of the wheel guard is made of a 7-in., 17¼-lb. channel and the sides, one of which is removable, are of ¾-in. steel plates. A counter-balancing weight for the motor, wheel and guard hangs within the column. The motor is designed with a double row of ball bearings at the wheel end and a single row at the free end.

Specifications and Operation

The work-table measures 36 in. by 48 in. and has a power travel of 24 in. It is also provided with a 7-in. manually operated cross-travel or feed for bringing the work into contact with the wheel, and the same manual effort provides any desired pressure of the

work against the wheel. The table travels on four roller bearing rollers which revolve on eccentric pins, employed as an easy means of taking up wear. Special provision is made for protecting and wiping the table-ways. The maximum speed of the table is seven complete strokes per minute, and that of the wheel is four complete strokes per minute. Both the wheel and the table travel can be slowed down, as desired, to practically zero.

The mechanical and hydraulic features of the wheel and table travel are essentially the same; the mechanism of the table drive is as follows: In a horizontal position beneath the table is the hydraulic power cylinder, the double acting piston of which is connected to the table. Mounted on the side of the machine are two vertical cylinders, each one feeding oil to one end only for the power cylinder.

Compressed Air for Creating Oil Pressure

Air is tapped off the shop line to the tops of the vertical cylinders, each of which contains a free piston which is packed to prevent leakage of oil and air. These vertical cylinders are filled with oil to about two-thirds height. Thus each free piston floats on oil and is actuated by the air pressure from above. The oil chambers are piped to an oil control valve, which is in fact a duplex valve in that it permits oil to flow from one cylinder to, say, the head end of the power cylinder and back into the same vertical cylinder, and from the other cylinder to the opposite end of the power cylinder and return. A by-pass levels the oil in the two vertical cylinders should leakage occur past any of the pistons.

The oil control valve is connected by flexible couplings and a short shaft to an air valve which controls the air to the vertical cylinders. A lever attached to the shaft makes hand operation possible if desired. The throw of this lever is regulated by two adjusting screws so that the table speed can be either slow or fast in both directions or slow in one direction and fast in the opposite. If quick manual operation is wanted, a pin can be pulled so that the adjusting screws are out of play, but with adjustment undisturbed. On each side and beneath the air valve are two small air cylinders, con-

trolled by adjustable dogs mounted on the side of the table, which serve to throw the air valve which controls the length of table travel as desired; this travel ranges from 24 in. to 1½ in., and at either extreme position there is always an oil cushion remaining at the head of the power cylinder.

Power operation of the wheel is the same as for the table except that the wheel power cylinder must act through bell crank and links to the motor carriage.

With the automatic up-and-down movement of the wheel and the table movement across the wheel, the operator has only to operate the feed and to manually force the work against the wheel. Positive feed on regular work is by a hand-crank operating through an inclosed worm and gear. For fast feed or for following irregularities on a casting the crank and worm gear are disengaged and a lever, which is connected direct to the table feed mechanism, is engaged.

Disk Chart for Resistance Welding Data

THE "Weld-O-Meter" is a quick reference circular disk chart that tells the correct type of equipment and the right control settings for spot or flash welding any gage metal at any required production rate. It has been developed and issued by the Thomson-Gibb Electric Welding Co., Lynn, Mass.

Window arrangement provides that a single turn of the disk presents information as follows: on one side, the type welder required, the transformer capacity, the heat regulator setting and the pressure needed to spot weld material ranging from No. 26 gage to ¼-in. at speeds from 30 to 120 spots per min. of the lighter gages, and to 5 to 20 spots per min. on the heavier stocks. Data are given on the current consumed per 1000 welds in kwhr. and alternative welders for the same work are shown.

The reverse side of the chart provides similar information concerning equipment used for butt or flash weld metals ranging from 0.01 sq. in. to 2 sq. in. in cross-section area. Complete information on the type welder, the proper clamping and push-up devices, the transformer capacity, heat setting and push-up pressure as well as the current consumed and the hourly production is shown when the dial is set at the point on the chart which represents the area of the metal to be welded.

New Heavy Duty Roll Grinder Employs V-Belts

TO attain high finish and freedom from roll marks which impair the smoothness of final lacquer coatings on metal strip and sheet used, for example, in automobile bodies, refrigerator cabinets, furniture, etc., the Farrel-Birmingham Co., Ansonia, Conn., announces the new 36-in. by 12-ft. Farrel heavy-duty roll grinder, shown on page 41. The machine is built with a multiple V-belt drive for rotating the rolls. The head-stock drive is self-contained in one cast iron case mounted on the front bed. Three reductions, all of which are multiple V-belt drives, reduce the speed of the 300-1200 r.p.m. motor to give a range of roll speeds from 11 to 44 r.p.m. The drive is equipped with Timken precision-type bearings throughout, including the bearing supporting the large faceplate pulley. The bearings are mounted in adjustable housings and each of the three reductions can be adjusted separately to give the proper tension on the belts without the use of idler pulleys. The bearings are grease packed; additional grease, infrequently needed, is applied by a grease gun through readily accessible fittings.

An improved type of flexible faceplate, with balanced, self-equalizing bar equipped with adjustable rubber-bushed driving dogs, compensates for inequalities in roll wabblers and automatically minimizes inaccuracies due to minor errors in setting the roll.

The diameter of the grinding wheel has been increased from 30 in. to 36 in. so that, at the same wheel surface speed, the speed of the spindle is reduced, permitting a closer fit of the bearings and resulting in cooler running bearings.

Other standard features of Farrel grinders have been incorporated in this machine, including a patented cambering device which produces a mathematically accurate curve for a crowned or concaved roll, exactly symmetrical both sides of the center of the roll; dead center head and footstocks; water-shedding front bed; centralized controls at the operator's station; flood lubricated, inverted V-ways; flexible steel covers for the carriage ways and drive rack; double helical gear to worm and rack traverse drive; and multiple V-belt spindle drive.

Hydraulic Power Units In Three Stroke Sizes

EX-CELL-O AIRCRAFT & TOOL CORPN., Detroit, Mich., announces a new self-contained, hydraulic power unit, for drilling, reaming, counterboring, spotfacing and similar operations.

The units, illustrated on page 41, are available in three sizes. They can be mounted in any position, either singly or in multiples, and operated individually or collectively with a manual or by remote control. The small unit, No. 23, has an 8-in. stroke; the medium, No. 25, has a 10-in. stroke, and the large, No. 28, a 12-in. stroke. Each is adjustable for length of stroke, length of rapid traverse and length of feed. The rate of feed can be changed while feeding through graduated adjusting valves controlled from without the housing. There are two forward feeds, each independent of the other, and adjustable dogs for controlling the rapid traverse, feeds, stop and reverse of the unit, are provided. Essential parts are

accurately machined, hardened and ground. Alloy steel parts are used wherever possible. The motor, mounted on an adjustable base above the unit, drives the hydraulic pump and drive shaft by V-belts. The pump driving shaft is connected through change gears to the spindle driving shaft, which at the inner end is splined and forms a sliding driver connection with the spindle; the splines are accurately ground to size. The spindle is supported at both front and rear ends in the main quill which carries a hydraulically operated piston. By changing pressure at either end of the piston the main quill or ram moves either forward or backward, providing the feed for the unit. The speed of the spindle can be changed by removing the cover plate at the rear of the unit and changing the speed gears.

The quill or ram of the hydraulic unit is furnished with a mounting flange for attaching multiple spindle heads. The hole in the spindle nose is accurately ground and has a keyway for driving the multiple head or tools. A sight gage is provided to show the

level of the oil and a pressure gage is provided for indicating the hydraulic pressure. Adjustment of the gage is accessible from the outside.

A machined pad is provided on each side of the unit near the front end for attaching guide bar brackets for multiple heads or jig plates. The base of the unit has two longitudinal keyways in the center for lining up. The side of the base flange is so designed that it may be machined as a dovetail slide if desired.

Splash Proof Motor Accessibly Arranged

CENTURY ELECTRIC CO., 1806 Pine Street, St. Louis, Mo., announces a new line of splash proof slip ring polyphase motors, suitable for installations where the area is washed down at intervals, or for outdoor installations. The motor is constructed with baffled openings in the lower part of the end bracket to admit cooling air and exclude splashing water. The motor is pictured on page 41.

The bearing bracket on the drive end is one-piece construction, the end bracket on the end opposite the drive is constructed with a gasketed covered hand hole for a convenient inspection of brushes and rings, a pipe plug for easy access to the grease plug and a removable section covering the whole end of the bracket which protects the end assembly of the motor. This arrangement is said to render all parts easily accessible and splash proof.

Vaporproof Light for Barrel-Drum Inspection

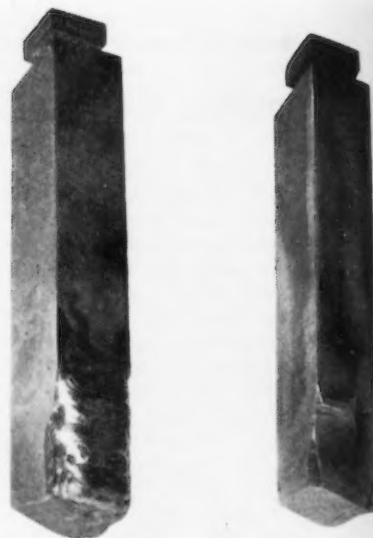
VAPORPROOF barrel and drum inspection lights are now being offered by the Pyle-National Co., 1334 North Kostner Avenue, Chicago. Vaporproof construction is used throughout to permit the lamp to be inserted in barrels or drums with safety. Entrance can be through bungholes 2¼-in. diameter and larger. The overall length of lamp, including handle and spike, is 30 in. Protection to lamp and lamp socket is provided through the use of a glass tube inside of the slotted brass guard. The tube is sealed at one end by the spiked cap that screws into the guard and sealed at the other end by the socket housing which also screws into the guard.

(CONTINUED ON PAGE 42)



AT RIGHT
Electrode for Restoring
Faces of Worn Tools—
Hardness of the salvaging
deposit assures long life
for reclaimed cutting
edges.

See page 42, column 2.

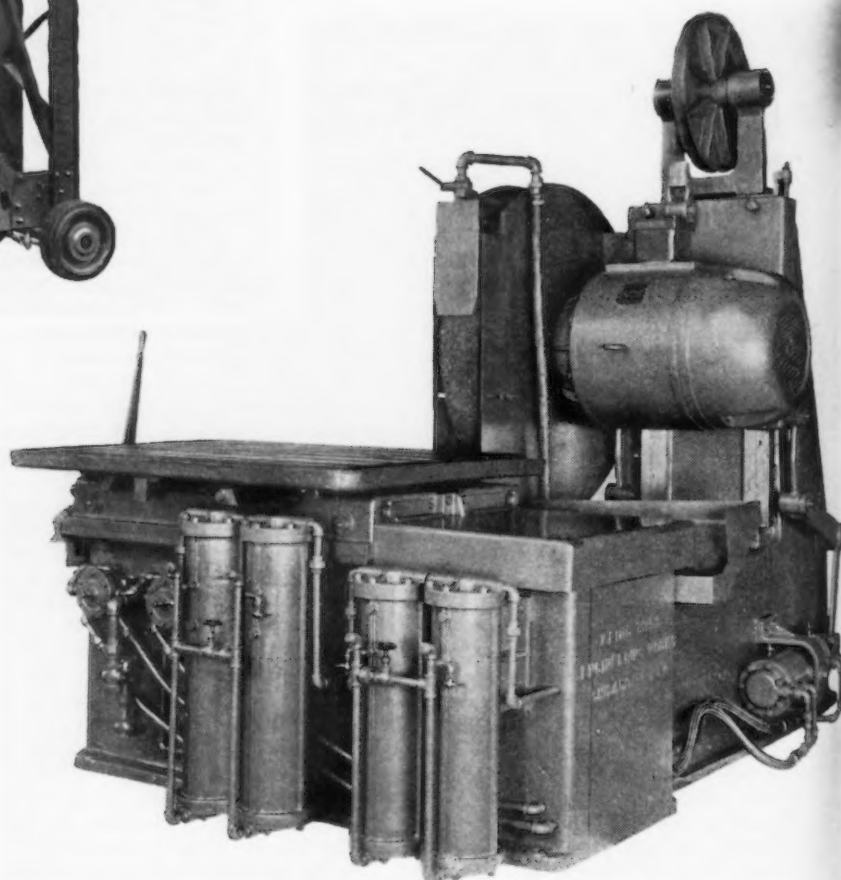


ABOVE
Industrial Scoop Truck Latches
Automatically. In the manufacture
of its line of industrial trucks this
company features standardization
of parts.

See page 42, column 1.

BELOW
Hydraulic Snag Grinding Machine Uses Air-Gen-
erated Oil Pressure and has vertical feed for the
direct motor mounted wheel as well as horizontal
feed for the table.

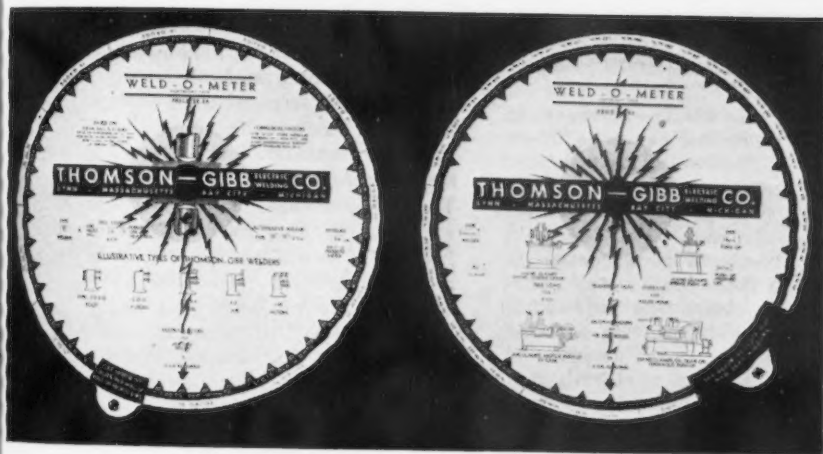
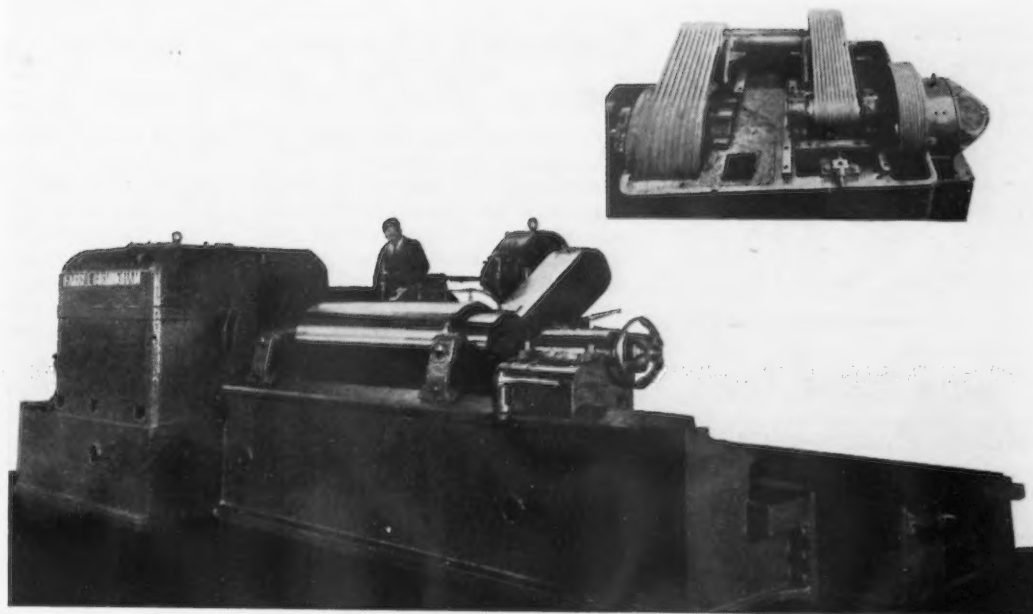
See page 38, column 1.



AT RIGHT

New Heavy-Duty Roll Grinder Employs V-Belts—In each of three speed reductions multiple V-belts serve to reduce vibration.

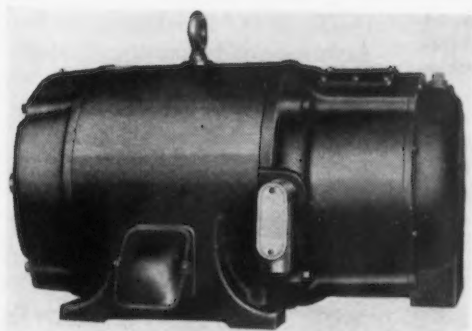
See page 39, column 1.



AT LEFT

Disk Chart for Resistance Welding Data—Quick determination of quiding factors is offered through the use of this window chart device.

See page 38, column 3.



Splash-Proof Motor Accessibly Arranged—Provision for the admission of cooling air and the exclusion of splashing water are also incorporated in the design.

See page 39, column 3.



ABOVE

Hydraulic Power Units in Three Stroke Sizes for machining operations under either manual or remote control of single or multiple power units.

See page 39, column 1.



Vapor Proof Light for Barrel-Drum Inspection—The element of inspection hazard is reduced through the use of this sealed device.

See page 39, column 3.

(CONTINUED FROM PAGE 39)

Entrance of harmful gas at the cord outlet end of handle is prevented through the use of a strain relief bushing. The socket is a weatherproof Bakelite type and is provided with a threaded shank that screws into the socket housing. The handle is of ½-in. pipe 18 in. long. Type T-10, 25-watt lamps are used. See page 41.

Industrial Scoop Truck Latches Automatically

THE Baker Industrial Truck Division of the Baker-Raulang Co., Cleveland, is marketing a new scoop truck of 2500-lb. capacity designated as type HFG, and especially adapted for handling all manner of loose material such as sand, clay, crushed stone, cinders, waste or scrap material, or for loading coal into stoker hoppers in power plants. The equipment is pictured on page 40.

In operation, for picking up a load, the lip of the bucket is pushed into the pile by the travel of the truck. The lifting mechanism first tilts the bucket back into the carrying position and then raises it vertically to any desired height. In dumping, the carriage is raised to the extreme top of the uprights, where it is automatically latched and the lift control is put into the lowering position, allowing the bucket to go forward and dump. In lowering, the operation is reversed—the bucket is brought back against the carriage, the carriage latch is released, and the bucket and carriage are lowered together. The upper limit of the carriage travel is protected by an automatic limit switch and the lower limit by a positive stop; these prevent injury to the mechanism.

The truck is built of Baker "interstandardized" parts; the frame, motors, axles, controllers, hoist unit, steering mechanism, etc., are interchangeable with the corresponding parts used in other Baker trucks. The bucket is ¼-in. steel plate, formed to shape, and electrically welded with an additional wearing plate of chrome-manganese steel on the lip.

The cubic capacity and shape of the bucket may be varied within reasonable limits, the height of lift and dumping angle can be furnished to suit conditions. Storage battery or gasoline-electric power can be supplied as desired.

Electrode for Restoring Faces of Worn Tools

AN arc-welding electrode, designed for restoring worn cutting edges on tools of all kinds and which is said to permit savings of 20 to 25 per cent in tool cost is announced by the Lincoln Electric Co., Cleveland. The illustration on page 40 left, shows deposit before grinding and, right, after severe cutting service.

Lathe tools, bits, cutters, drills, cutting and forming dies and similar equipment which has become worn in service can, it is said, be given a new and harder cutting edge than has heretofore been attainable; also unlimited numbers of refacings are said to be practical.

"Toolweld" electrode provides a deposit the equivalent in hardness of high-speed tool steel, and having an advantage of retaining its hardness under relatively high temperatures, up to approximately 1000 deg. Fahr.

Without the treatment the weld metal as deposited has a hardness of 55 to 65 Rockwell C, but the degree of hardness will vary somewhat, depending upon the admixture of base metal with the weld deposit; hardness is increased by permitting the deposit to cool slowly and by depositing additional beads. The deposit can be heat treated in the same manner as high-speed steel but at slightly less temperature.

Tests of cutting edges built up with this electrode are said to reveal interesting results; for example, in a recent test a tool faced with "Toolweld" turned 14 motor generator shafts to a depth of 3/16 in., the length of cut being 15 in. Using ordinary tool steel, 12-in. cuts 3/16 in. deep were made on six shafts. In both cases the operating speed was 117 r.p.m. Inspection of the two tools at the end of the test showed that the one faced with "Toolweld" had a square, sharp edge, whereas the cutting edge of the tool-steel tool had become rounded off.

The deposit consists of typically dense non-porous shielded arc-weld metal. The electrode is covered with a coating which, as it is consumed in the arc, shields the arc from the atmosphere and prevents the formation of oxides and nitrides in the weld metal. This coating also serves to steady the arc and to insure a smooth, uniform weld deposit.

"Toolweld" electrode is made in 14-in. lengths and in four sizes, 3/32-in., ¼-in., 5/32-in. and 3/16-in., packed in 5-lb. containers.

Difficulties of Machine Export to Germany

INTERESTING exchanges of correspondence are in evidence clearly indicating at least some of the difficulties in attempting foreign machine tool trade, particularly with Germany, under conditions of intended business-social reform which are so much to the fore at the present time.

Through cooperation with German machine tool agents and their representatives in the United States, a number of American machine tools, metal working supplies and equipments have, from time to time, during reasonably recent periods, been forwarded to Germany. Payments of commissions, handling charges, etc., have not been forthcoming. Insistence has brought out the fact that the German agent is allowed only to resort to principles of barter, and to reimburse his American representative only by shipping to him any of a number of German commodities, from the sale of which the American representative may jockey-out the amounts due him, if he can. The German agent may not use anything in the way of German funds or securities in satisfying these obligations. His only alternative lies in his being able to arrange some sort of personal credit in the United States based entirely on confidence or upon the hope of future changed conditions under which business relations may be resumed along lines of acceptable procedure, but for actual funds he may go no further. One of the ironies of the situation is that the American representative is almost constantly importuned to secure more equipment and ship it into Germany.

Stainless Steel Train for Italy

THE ALLEGHENY STEEL CO., Brackenridge, Pa., has shipped a quantity of stainless steel in strips, tubing, sheets and floor plates to Piaggio, Inc., Genoa, Italy, for use in construction of a stainless steel streamlined train to be modeled after the Burlington "Zephyr." This new Italian three-car train, like the "Zephyr," will be built by the "shot-weld" process of construction perfected by the Edward G. Budd Mfg. Co., Philadelphia, which will supervise the building of the train.

Molybdenum Displaces Tungsten In New High-Speed Steel

MOLYBDENUM high-speed steel of a type in which the beneficial effect of the molybdenum is augmented by the addition of a lesser amount of tungsten is said to be coming rapidly into commercial use and to be of such high quality that it is now challenging the supremacy of the long established 18 per cent tungsten high-speed steel. This is indicated by the issuance of licenses to sell this steel, which is commercially designated as Mo-Max high-speed steel, to six leading producers of high-speed steels.

This type of molybdenum high-speed steel was developed by Joseph V. Emmons, metallurgist of the Cleveland Twist Drill Co., Cleveland, and was announced in a paper presented by him at the 1932 meeting of the American Society for Steel Treating, now the American Society for Metals. Commercial development of this high-speed steel has followed.

The common type of high-speed steel known as the 18-4-1 type has as its constituents 18 per cent of tungsten, 4 per cent of chromium and 1 per cent of vanadium. In the Mo-Max steel 8 per cent of molybdenum is substituted for 16 per cent of tungsten, reducing the tungsten content to 2 per cent. The approximate composition of this high-speed steel as now produced commercially is as follows:

Molybdenum, 8 per cent
Tungsten, 2 per cent
Chromium, 4 per cent
Vanadium, 1 per cent

The carbon content is about 0.10 per cent higher than that in comparable grades of the 18-4-1 steel.

Much of the work that has been done on molybdenum cutting tools has been aimed at the complete elimination of tungsten, and investigations that have been conducted by the United States Army at the Watertown Arsenal, Watertown, Mass., have been along the line of the substitution of molybdenum for tungsten in whole or in part.

Little Change in Technique of Working

The technique of working the Mo-Max type of high-speed steels is similar to that which has been developed for the 18-4-1 type. Forging and rolling is done at slightly lower temperatures than with 18-4-1, but it forges somewhat more easily.

Annealing is done in exactly the same manner as with 18-4-1, using

the same temperatures and times. The resulting hardness is slightly less than that of 18-4-1, which is probably the reason that the Mo-Max type is claimed to be somewhat more easily machined than the 18-4-1 type.

Hardening is done in a similar manner to the 18-4-1 type, except that the hardening temperatures are about 150 deg. F. lower. The hardening temperatures are varied according to the carbon content of the steel and the type of tool is made just as is done with 18-4-1.

Tempering is done in the same way and at the same temperatures as 18-4-1. The hardness of hardened and tempered Mo-Max steel is usually slightly higher than that of 18-4-1. This is believed to be due to more carbon being dissolved in the steel. Tools made of this steel are said normally to exhibit greater hardness than those made of 18-4-1, but at the same time to have toughness equal or better.

No Change in Machine Speeds and Feeds Required

On regular production work, it has been observed that tools made of this molybdenum steel are scarcely distinguishable on performance from those made of 18-4-1. Their performance is at least as good. No change in speeds or feeds of machines is required when cutting tools of this steel are substituted for tools made of 18-4-1 steel.

It has sometimes been observed that the type of production work upon which Mo-Max has shown a definite advantage has been the difficult job where trouble was being experienced with 18-4-1 high-speed tools.

The specific gravity of Mo-Max is about 9 per cent less than that of 18-4-1, which means that a less weight of steel is required to make a tool of a certain size than is necessary when the 18-4-1 type is used.

The grinding sparks of the steel have a distinctive appearance, which makes it possible readily to distinguish it from 18-4-1 and other types of steel.

The United States has been dependent upon foreign sources for about 75 per cent of its tungsten requirements. A large part of the tungsten consumed in this country, perhaps 75 per cent, is used in the manufacture of high-speed steel. American mines were not able to supply more than 25 per cent of

the tungsten we needed even under the stimulus of the high prices that prevailed during the war, when high-speed steel advanced to \$3 per lb. However, it is estimated that the small but valuable tungsten mining industry in this country would be able to supply all our requirements in tungsten should all the high-speed steel be made of the new type with the low tungsten content.

The imported tungsten has been largely supplied from China, although the production in Burma, the Malay States and other countries has been quite appreciable. With the bulk of the supply coming from China, the price of tungsten has been largely controlled by the amount of Chinese tungsten available. Tungsten prices have fluctuated over such a wide range during the past 20 years that a feeling of instability has arisen and industry has been forced to carry large and expensive stocks of tungsten for its own protection.

The War Department has considered tungsten an essential strategic material, from which this country could not be cut off in time of war. This probably accounts for the interest the War Department has shown in the development of molybdenum high-speed steel as a substitute for tungsten.

This country produces about 85 per cent of the world's supply of molybdenum and it is known that the molybdenum ore reserves are sufficient to last for many years. There is, therefore, ample supply of this element available for all probable requirements. As the new type of high-speed steel contains 8 per cent of molybdenum, the molybdenum consumption in this field is potentially large.

The producers of high-speed steel who are licensed for the manufacture of the new molybdenum steel are Crucible Steel Co. of America, Ludlum Steel Co., Universal Steel Co., Cyclops Steel Co., Latrobe Electric Steel Co., Jessup Steel Co., and Braeburn Alloy Steel Corp.

Diesel Power Gains In Tractor Use

A MARKED gain in the use of Diesel power for tractor use was revealed at the International Caterpillar Reunion, held in Peoria, Ill., in January. Diesel production of Caterpillar Tractors, made by the Caterpillar Tractor Co., has increased from a total of 1056 hp. in 1931 to 237,314 hp. in 1934, according to a report of the company.



L. S. HAMAKER

Effective Advertising Does Not Depend on Size of Budget*

By L. S. HAMAKER

*Vice-President and General Manager,
Berger Mfg. Co., Canton, Ohio*

BASED on experience of the recent past I am inclined to believe that industrial advertising may tend to lag behind general recovery, while consumer advertising tends to anticipate it. I know that some gains are being made in industrial advertising but I do not believe they are proportionate to the general gain. Consumer advertising is absorbing an unnaturally large proportion of the total advertising investment just as consumer goods are today absorbing an unnaturally large proportion of the total national income.

There are perfectly sound reasons why this is true but it makes the going tough for those who do not make consumer goods and must advertise and sell to industry. The great difficulty today for the man who has something to sell is to get a proper perspective. So many confusing things are being done that it may seem at times that the old yard-sticks no longer function, but I am trying to base our business policies on realities. Compared to the public pronouncements on the business outlook for 1935 I may seem pessimistic but this is not the case.

If we learned any lesson at all from 1934 it was that recovery comes in its own good time and that it is irresistible and inevitable, whether retarded by governmental experiments or promoted by wise administration. I am basing our 1935 policy on the premise that total national income for 1935 will

not be materially greater than in 1934. Consumer goods are absorbing a disproportionate share of the national income, chiefly because consumer goods prices are high in relation to national income. In spite of this sales volume of consumer goods is well maintained. Again, consumer goods sales depend on wages.

Durable goods sales depend to an important extent on the flow of investment capital into industry. With profit microscopic or nonexistent in most industries, private capital remains in hiding or seeks safety in Government securities. There isn't much in the immediate industrial picture to attract private capital, which is very timid, and I don't believe Congress will do much to reassure it.

Sales Strategy Not Changed

Sales and advertising strategy have not been changed in any fundamental way but they have certainly been tightened up all along the line. We don't see much of the aimless advertising based on hope these days. It smacks too strongly of waste, and no business can afford waste. Two years ago I made a plea for the selection of specific markets and concentration upon those markets during the depression. It is fairly evident that management generally has been forced to this policy by the very struggle to stay afloat. The most careful planning has been done, through grim necessity, to conserve selling resources. The concentration on markets of greater promise has become a first principle, and it is a good thing. All of us will be better business men and

better advertising men for having gone through this period.

Everyone concerned with marketing has by this time learned, I hope, to scale down his expectation of sales volume to the realities of the situation. We no longer speculate on sales or advertising splurges but are inclined to depend on the more ordinary or conventional type of sales activity. We have reduced or eliminated branch sales organizations whose maintenance was too expensive in the face of declining sales volume. By the same token we have eliminated advertising to fringe markets, which only repay cultivation in boom times.

Many manufacturers built up large direct selling organizations in the days of easy selling. Today there is a distinct trend toward the wider use of jobbers and distributors, particularly in thin territories where direct salesmen can no longer pay their way. This again changes the advertising picture, for not only is it necessary to sell the jobber; you must help him move the goods. As a complex system of agencies and outlets is built up, the advertising and sales promotion job ceases to be the simple function of telling the world that it was a few years ago and becomes a detailed and intricate task.

"Volume at Any Cost" Days Gone

Shortly after the war, the phrase, "profitless prosperity," came into existence, chiefly because marketing executives sought volume at any cost. The depression certainly has completed the demonstration of the dangers inherent in businesses built purely on the foundation of volume selling. All of this offers real opportunity

* Abstracted from an address before the Pittsburgh Advertising Club, Jan. 29. Mr. Hamaker was formerly advertising and sales promotion manager of the Republic Steel Corp., of which the Berger company is a subsidiary.

to the industrial advertising man. Selective selling is impossible without careful market study. It is always possible to secure an adequate advertising appropriation for any job if it is specific enough and facts and figures support it. Today I refuse to approve any request in our own company until I can be shown that there is a definite job to do and that the potential business will justify the effort, and incidentally the expense.

There was a time not so long ago when the calibre of an industrial advertising man was judged by the size of his appropriation. Today, I know of several excellent advertising jobs being done at relatively small expense — well-planned, selective programs doing a specific job. I admit freely that general ballyhoo has its advantages, if you can afford it. I also realize that there are sometimes policy reasons for doing a broadcast advertising job, but it is the day-in-and-day-out, month-after-month concentration on known markets that brings home the bacon in the long run. It may not be spectacular. It probably won't be physically handsome, but if it is telling a good story persistently to an industry or a group of prospects to whom that story is of definite personal interest, it simply cannot fail. If I had to hire an advertising manager for our company today I would look for a fellow who is doing that kind of a job and the size of his appropriation wouldn't make very much difference.

Realistic Outlook Essential

I have said that a realistic outlook is essential to successful industrial advertising today. In the same breath I am bound to admit that a proper estimate of the immediate business outlook is not easy to arrive at. It is hard to separate the grains of truth from the tremendous mass of inspired material that adorns the pages of our press. While I am not out of sympathy necessarily with the recovery efforts being made at Washington, I do disagree with some of the methods, which I assume anyone has a right to do. The artificial stimulation of commodity prices as a recovery measure strikes me as a fallacy. History would indicate that the establishment and maintenance of prices at any desired level is a goal which has eluded mankind since the beginning of time.

To make intelligent plans for advertising or anything else, everyone must make up his mind as to the outlook during 1935 for his particular business. The steel business has picked up remarkably over the year-end, largely because of

automotive activity. This abnormally early start will cause the usual late spring decline to begin earlier than usual. Generally speaking, I expect steel to have a 15 per cent better year in 1935, with most of the relative improvement in the second half.

The automotive industry is highly enthusiastic about its prospects. Automobile production last year was 45 per cent ahead of 1933. This year I expect it to hold at about the same figure despite optimistic predictions of still further huge gains. If there is any gain I think it will be slight, because I don't see where there can be any substantial gain in national income in 1935, and I don't see how the automotive industry can expect to secure a larger proportion of the national income for itself under current conditions. Therefore it seems that any automobile improvement is likely to be in export and not in domestic sales.

The building picture is not entirely clear. Public works will continue on about the same scale as last year, for experience has shown that no matter how much money may be appropriated, it is physically impossible to spend it faster than at a certain rate due to the engineering and preliminary work required.

The renovating and remodeling campaign seems fairly successful so far, though it can be no more than a drop in the bucket as compared to a year of normal building volume. Great interest and great hopes for the revival of the building industry have been aroused by the activity at Washington, and the localized projects. It is quite evident that building is now the spearhead of the Administration's recovery drive. The average person may, or may not, worry very much about the huge expenditures for public work but he certainly wants to know when home building is going to start.

Prospects for Steel House

Home building normally represents a very large proportion of total building volume and the home building business instead of being concentrated at different points as public works necessarily are, is distributed to every city, town and hamlet.

Aside from normal building recovery, several steel companies are conducting experiments which point to a much larger use of steel in small house construction. At Berger we are working on a low-cost steel frame construction which may conceivably become a standard article of commerce in the building business. If quantity production

can be reached, the cost will be less than ordinary wood construction for a home of exceptional durability, comfort and fire safety.

In view of this fact, I think we not only may safely expect much more construction in 1935, but that the steel industry may expect to play a much larger part in the home building picture than it ever has before. We feel that if our experiments lead to the use of one and a half or two tons of steel in a small home, which is more than an automobile contains, we shall have made a very notable contribution to the steel industry as a whole.

Advertising's Part In Recovery

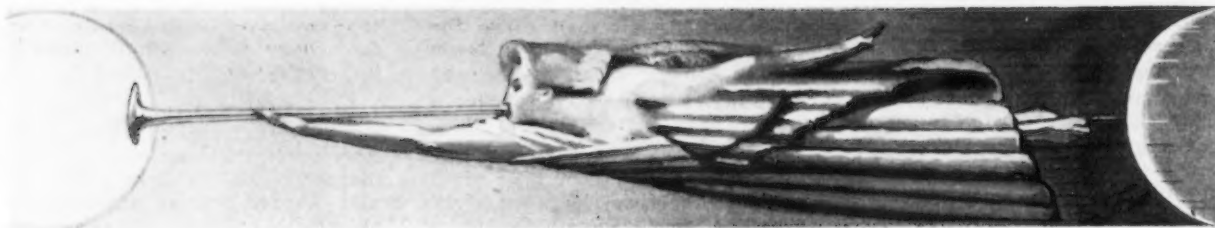
I think most business men know or sense that we are in for several years of progressively better business, and, while the gains may not be spectacular, the trend is at last definitely in the right direction. Well considered advertising will play an even more important part in the recovery picture than it has in the past. Poorly considered advertising of the shot-gun type will be almost a curiosity by the time our next prosperity period arrives. Then, I suppose, the cycle will start over but I think all of us will carry with us some very definite memories of the first half of the nineteen-thirties.

I have not lost faith in advertising. It is more secure than ever. In my own company, however, I find that it is not the first job to be done. I have placed the development of an aggressive sales force, the rehabilitation of existing products and the development of new products ahead of a complete advertising program. I have, as I said, become a realist. I am going to be very sure that when we do begin to advertise substantially, and I impatiently await that day, the advertising will click because the organization will be capable of living up to it in every sense.

New Prices Filed

MINIMUM prices of 3.20c. a lb. on tin plate strips and 3.45c. a lb. on waste waste tin plate, f.o.b. Pacific Coast ports, have been filed under the steel code to become effective Feb. 4. The Pittsburgh quotations on these products are 2.50c. a lb. on tin plate strips and 2.75c. a lb. on waste waste tin plate.

Class 23 tool steel billets have been reduced from 42.3c. a lb., Syracuse, N. Y., to 37.8c. a lb., effective Feb. 5. Class 23 tool steel bars have been lowered from 47c. a lb. to 42c. a lb., Syracuse, also effective Feb. 5.



NEWS OF THE WEEK

Steel Corporation Pays 1/2 Per Cent Dividend

EARNINGS and income of the United States Steel Corp. for the quarter ended Dec. 31, 1934, amounted to \$3,761,716, and a 50c. dividend on account of preferred stock was voted at the board of directors meeting, New York, Jan. 29. The earnings were those after deducting all expenses, including ordinary repairs and maintenance, including also estimated Federal, State and local taxes (exclusive of charge for proportion of overhead expenses and taxes shown below) and reserves for contingencies.

The deficit from operations after charges and allowances for depletion, depreciation and obsolescence of \$10,639,244, and interest charges for the quarter of \$1,256,093 was \$8,133,621. This was increased \$2,192,907 by the proportion of overhead expenses (of which taxes alone are \$1,784,790) of the Lake Superior iron ore properties and the Great Lakes transportation service, normally included in the value of the season's production of ore carried in inventories, but which, because of curtailment in tonnage of ore mined and shipped in 1934, is not so applied. The dividend calls for \$1,801,405, and the total deficit for the quarter is \$12,035,818. The total deficit for the year provided from undivided surplus is \$28,906,524.

Shipments of finished steel products for the quarter ended Dec. 31, 1934, amounted to 1,128,711 tons.

Myron C. Taylor, chairman of

the board, issued the following statement:

The reduction in operations which set in with the opening of the third quarter of 1934 continued into the last quarter of the year, reaching the low point in October for which month the production of finished steel products dropped to 19.1 per cent of rated capacity. In November and December there was a moderate increase, the average for the entire fourth quarter equaling 23 per cent of capacity. For the entire year the total output was 6,007,000 tons, or 31.2 per cent of capacity compared with 5,536,000 tons or 28.7 per cent of capacity in 1933.

The improvement in operations in the closing months of the year has continued since Jan. 1, the operations for the current week being 44 per cent of capacity.

Earnings results for the year show a net earned before allowances for depreciation of \$22,884,871, compared with a similar net in 1933 of \$7,083,376. The comparative net results for the two years including allowances for depreciation and dividend of \$2 per

share declared on preferred stock were as follows:

	1934	1933
Net earned before charges as below	\$22,884,871	\$7,083,376
Allowances for depreciation	44,585,775	43,584,499
Deficit	\$21,700,904	\$36,501,123
Dividend of \$2 per share on p'fd.	7,205,622	7,205,622

Total deficit

for year. \$28,906,526 \$43,706,745

During the year there was expended for additions and betterments and mine development a total of approximately \$7,450,000.

The status of the net working assets of the corporation and subsidiary companies has been well maintained compared with conditions at close of 1933, the comparison showing an increase during the year of approximately \$11,500,000.

Comparative employment results were as follows:

	1934	1933
Total number of employees	189,900	172,577
Total pay roll	\$210,503,000	\$163,149,503
Per cent increase	29	
Average earnings per employee per hour, cents.	70	59

Steel & Tubes To Enlarge Plant

STEEL & TUBES, INC., Cleveland, will enlarge its Cleveland plant by the erection of a single story factory-type building providing 40,000 sq. ft. additional to the present floor space of 150,000 sq. ft. The addition will be made to increase the capacity of the present plant and to permit the consolidation in Cleveland of some of the company's op-

erations. The general contract has been awarded to the Austin Co., Cleveland. Steel & Tubes, Inc., is a subsidiary of the Republic Steel Corp. and a large producer of electrically welded tubing.

Ohio River Steel Movement Declines

MOVEMENT of iron and steel products on the Ohio River in the Pittsburgh district in December amounted to 46,887 net tons,

compared with 51,710 tons in November, 46,475 tons in October, and 36,038 tons in December, 1933, according to the latest report of the United States Engineer's Office, Pittsburgh. Total movement of steel products on the Monongahela River in December was 42,248 tons, compared with 48,556 tons in November, and 38,693 tons in December, 1933. Shipments of iron and steel on the Allegheny River last month totaled 1300 tons.

Group Drive Topic At Philadelphia

ALFRED KULLMAN, research engineer, of the Mechanical Power Engineer Association, addressed a group of 51 of Philadelphia's most prominent engineers in the Benjamin Franklin Hotel, recently. His subject was "The Modern Group Drive" and its application.

R. M. Pindell, president of Alexander Brothers, opened the meeting with a short welcoming address. Then followed luncheon and a film on "Modern Drives" accompanied by an electrically transmitted talk by Victor A. Hansom, R.E.

After the luncheon, Mr. Kullman again addressed the meeting in the Philadelphia Electric Co.'s exhibit room where he demonstrated a working model illustrating the comparison of efficiency between the modern group drive and direct drive.

Sales of Wire Under Code Are Clarified

THE directors of the American Iron and Steel Institute have approved three new commercial resolutions, Nos. A35, A36 and A37, all relating to the sale of wire products, which became effective Jan. 24. The first provides for deductions up to 35 per cent of the all-rail freight rate on shipments from Gulf Port basing points.

No. A36 concerns sales of wire products at points wherein code members maintain warehouses, while A37 revises the qualifications of wire jobbers in that they are not compelled to buy in carload lots.

Resolution A7, which concerns the deduction of States sales taxes from delivered prices quoted under the code, has been revised to cover procedure in the case of sales out of warehouse. Regulations No. 4 has also been revised slightly with respect to the quoting of prices on rail and water movements.

PERSONALS

WALTHER MATHESIUS, who has been made general superintendent of South Works, Illinois Steel Co., South Chicago, Ill., was educated at the Institute of Technology of Berlin, Germany, from which institution he received the degree of doctor of engineering. He came to America in 1911 and was first employed at the Worcester plant of the American Steel & Wire Co. He went to South Works in 1912, where he was engaged in the blast furnace department. In the fall of 1915 he was made assistant superintendent of the blast furnace department and in 1917 he was made superintendent of that department. In 1925 he was raised to assistant general superintendent, in which capacity he gave particular attention to the development of alloy steel production. He was made assistant general superintendent over all of South Works in 1929. He holds memberships in the American Institute of Mining and Metallurgical Engineers and the American Iron and Steel Institute, and he has presented technical papers before both associations. He is past-chairman of the Chicago chapter of the American Society for Metals and is at present a trustee of that organization.

CLIFFORD S. STILWELL was elected a vice-president of the Warner & Swasey Co., Cleveland, at the company's recent annual meeting. Mr. Stilwell has been with the company for 23 years, during the past four years of which he has been sales manager. After graduating from Denison University he took

the company's apprentice course and then joined the sales department in the Chicago district. For 14 years he was Detroit district sales manager.

JOHN H. VOHR, formerly assistant superintendent of a continuous strip mill of the Inland Steel Co., Chicago, has been appointed superintendent of the continuous hot wide strip mill of the Youngstown Sheet & Tube Co. Mr. Vohr has been assisting in the installation of the new strip mill. A graduate of Cornell University, early in his career he was identified with the American Sheet & Tin Plate Co. as master mechanic at Farrell, Pa. After 12 years he was transferred to the company's Gary plant where he became assistant superintendent of the strip mill. Some years later he went with the Inland Steel Co.

WILLIAM P. GLEASON will be succeeded by **WALTER E. HADLEY** as general superintendent of the Gary works, Illinois Steel Co., effective Feb. 12. Mr. Gleason is retiring under the company's pension plan. He started at the old Joliet works in 1878 as an apprentice machinist. In 1886 he was made a machinist and in 1898 he was forced because of ill health to go to Colorado for a year. Upon his return he was made assistant master mechanic and in 1901 he went to Clairton Works as master mechanic, later being made assistant general superintendent. He was moved to Gary when that plant was started in 1906. He has served that plant as



W. MATHESIUS



CLIFFORD S. STILWELL



J. H. VOHR

general superintendent since that time. Mr. Gleason has always been very active in Gary civic affairs. WALTER E. HADLEY is a graduate of Massachusetts Institute of Technology. His first work was with the National Tube Co. at McKeesport. In 1909 he was transferred to the Ensley, Ala., works as assistant superintendent of blast furnaces. He served as superintendent of blast furnaces at Bessemer, Robertsdale and Birmingham. He went to Chicago in 1916, where he became president of the Trojan Electric Steel Co., and in 1918 he accepted the position of assistant general superintendent at the Gary works.

E. J. KULAS, president, Otis Steel Co., Cleveland, will sail this week for a Mediterranean tour lasting several weeks.

CARL STRIPE, for the past two years assistant to the vice-president of the Davis Coal & Coke Co., has joined the sales organization of the Combustion Engineering Co., Inc., New York, and will be in charge of industrial stoker sales.

E. W. BIXBY, formerly sales manager for the Columbian Iron Works, Chattanooga, Tenn., has become identified in a sales capacity with the Memphis, Tenn., office, at 67 McCall Street, of the Pittsburgh Equitable Meter Co. and its subsidiary, the Merco Nordstrom Valve Co., Pittsburgh.

WILLIAM ZORN, heretofore welding engineer for the Detroit Edison Co., has joined the C. H. Dockson Co., Detroit, as consulting welding engineer. Mr. Zorn has had an extended experience in the welding field. He was formerly identified with the Steere Engineering Co., Owosso, Mich.; Hydraulic Pressed Steel Co., Van Dorn Iron Works, both of Cleveland, and a number of railroads.

DURREL DAVIS, formerly chief engineer for the Highway Trailer Co., Edgerton, Wis., has joined the Spencer Trailer Co., Augusta, Kan., as chief engineer and production manager.

JOHN N. WILLYS has been elected president of the Willys-Overland Co., Toledo, plans for the reorganization of which are under way. He was the former head of the company, but retired in 1929. The company has been in receivership nearly four years, during which DAVID R. WILSON has been presi-

dent and receiver. Other new officers are: H. C. TILLOTSON, president, Tillotson Mfg. Co., vice-president; H. J. LEONARD, treasurer, and FRANK H. LANDWEHR, secretary, Electric Auto-Lite Co., Toledo, secretary.

FRANK E. EBERHARDT, heretofore vice-president and treasurer of the Newark Gear Cutting Machine Co., Newark, N. J., has been elected president. U. SETH EBERHARDT has been made vice-president and treasurer, and HENRY J. EBERHARDT continues as secretary.

H. D. THWEATT, formerly with the Birdsboro Steel Foundry & Machine Co., has been appointed sales manager of the Lake Erie Engineering Corp., Buffalo.

H. A. FENNERTY has been elected vice-president of the Alliance Machine Co., Alliance, Ohio. R. H. HARRY has been made general manager and R. R. STUCKEY, production engineer.

THEODORE TRECKER, president, Kearney & Trecker Corp., Milwaukee, has announced the appointment of PHILIP P. EDWARDS as vice-president. Mr. Edwards is resigning as vice-president of the First Wisconsin National Bank of Milwaukee to assume the new duties. He will assume charge of certain portions of the executive work which was formerly under the supervision of the late E. J. Kearney, secretary and treasurer, who died a year ago.

CARL G. DE LAVAL has been appointed sales representative of Electro Metallurgical Sales Corp. in the Pittsburgh district, effective Feb. 1. Since 1925 Mr. de Laval has been connected with the production department of the Electro Metallurgical Co. at the Niagara Falls, N. Y., plant. The new offices will be in the Oliver Building, Pittsburgh.

J. J. SWENSON, general sales manager of the American Cast Iron Pipe Co., has been elected president of the Birmingham Boys Club.

A. H. SKAER has been placed in charge of the Cochise Rock Drill Mfg. Co., a subsidiary of the Independent Pneumatic Tool Co. Mr. Skaer was formerly associated with the Denver Rock Drill Mfg. Co., and for many years was its president. He will make his headquarters in Los Angeles, where the Cochise plant is located.

OBITUARY

RAYMOND W. LIGHT, for the past 12 years associated with the Jones & Laughlin Steel Corp., died at his home in Detroit of a heart attack on Jan. 25. A graduate of Carnegie Institute of Technology, he early joined the Carnegie Steel Co. at its Clairton, Pa., plant, and later was connected with the Bethlehem Steel Co., at Johnstown, Pa. He also was affiliated for a time with the Crucible Steel Co. Twelve years ago he joined the Jones & Laughlin company at Pittsburgh, and for the past eight years had been a member of the staff of that company's Detroit district sales office. He was 47 years of age.

JAMES E. HIGGINS, formerly superintendent of the Whitcomb Foundry Co., and for over 10 years New England sales representative for the Reed-Prentice Corp., Worcester, died on Jan. 14.

RICHARD C. MEYER, president and treasurer, Lynx Wire Specialties, Inc., Milwaukee, died Jan. 22 after an illness of nine months at the age of 60 years.

JULIUS CANTOR, former president of the American Smelting & Refining Co., of Ohio, died on Jan. 21 at Cincinnati, after an illness of several weeks. He was 71 years old.

WALTER C. NAGLE, president of the Baker-Nagle Co., stove manufacturers, Belleville, Ill., died on Jan. 19 of uremic poisoning in a hospital at Bloomington, Ill. He was 44 years old.

FRANK MARRIOTT, president of the Alpha Machine Tool & Engineering Co., St. Louis, died there on Jan. 20 of pneumonia. He was born 58 years ago in Coventry, England, emigrating to New York and finally settling in business in St. Louis, in 1918.

FRANCIS J. FRISZ, mechanical engineer and chief estimator, A. O. Smith Corp., Milwaukee, died of heart disease on Jan. 18, aged 53 years. He was a graduate of Rose Polytechnic Institute, Terre Haute, Ind., and became associated with the Smith company 15 years ago.



By L. W. MOFFETT

Resident Washington Editor,

The Iron Age

WASHINGTON, Jan. 29.—In preparation for public hearings on policy relating to employment provisions, to begin Jan. 30, the NIRB has released an elaborate statistical survey. Consisting of two parts, one covering hours and wages, and the other population and geographic differentials in minimum wages, the report reemphasizes the two purposes of the survey: (a) to make available pertinent information with respect to the present provisions in the codes, and (b) to indicate some of the more significant issues in the situation.

The material was prepared under the supervision of L. C. Marshall of the Brookings Institution, executive secretary of the NIRB. Each part of the survey covers the 500 codes and 17 labor provisions of joint NRA-AAA codes approved Aug. 8, 1934, together with their 143 supplements and 35 divisions, a total of 695, embracing industries employing more than 22,000,000 persons.

Statistics are presented in all cases for 22 major codes and industry groupings, and in many cases are given in even greater detail. Extremely exhaustive, not to say exhausting, the survey takes into account a tremendous wealth of detail on the subjects covered and likely will be used freely at the hearings. These promise to be

even more lively than the first of the series which is under way on major code provisions with a view to revamping codes. It dealt with prices.

The employment provisions concern not only the highly controversial subject of labor, in which workers are deeply concerned, but also possible readjustment of labor provisions according to geographic differentials, etc., where conflict exists within industries. After analyzing the codes' wage differential provisions, the survey summarized four courses of action with regard to such provisions which have been urged upon NRA, together with a brief summary of the advantages and difficulties of putting each of them into effect.

The four approaches to the problems are, briefly, stated as follows: (1) A uniform national mini-

mum wage sufficient to furnish a minimum standard of living; (2) the pre-code status quo with regard to differentials; (3) the gradual elimination of existing differentials, with the uniform national wage minimum as a goal; (4) "fair competition" differentials, permitting wage differentials to absorb inequalities among districts in other cost factors, such as distance from market, stage of mechanization, and productivity of labor.

It was pointed out that in the ferrous codified industries 99.9 per cent of the employees are covered by the iron and steel code. It is referred to as a code with averaging provisions with no general overtime and with peak periods.

Expenditures for public works in 1936 and 1937 are going to be cut to a mere \$4,961,000,000. This

THIS WEEK IN WASHINGTON

NIRB provides statistical ammunition for forthcoming public hearings on code employment provisions. Issues elaborate survey covering 695 codes and supplements.

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Loan limit of FHA may be stretched to \$50,000 to speed industrial modernization if Congress accedes to Moffett's plea.

• • •

A.F. of L., finding rough sailing on its unionization course, prepares to rock the boat to scare the passengers. Will concentrate on steel and automobiles.

• • •

Missouri representative calls Congress "supine, subservient and soporific body of nitwits" in connection with relinquishment of powers to President.

• • •

Life of RFC is extended for two years with amendment calling for reasonable assurance of repayment rather than requirement of adequate security.

assurance has been given by Chairman Buchanan of the House Committee on Appropriations. To those who think that this is after all a sizable sum, it should be pointed out that it will represent a slash of about 48 per cent under like expenditures for 1934 and proposed for 1935, which Mr. Buchanan placed at the cool total of \$9,543,000,000.

Oil for the Taxpayer

Donald Richberg, Administration man Friday, has told the country to be patient with "scientific experiments in Government," declaring that unless it is "we will never get rid of the oil lamp Government. . . ." As he was giving this solace to the taxpayers, who are turning over some \$100,000,000 a month to make up an executive payroll alone, announcement was made of a loss of \$500,000 through a piece of science in Government.

It took several drops of oil out of the lamp when officials of the Subsistence Homestead Corp. stated that \$500,000 went to waste on the Reedsville, W. Va., project, said to have been originated by Louis M. Howe, secretary to the President, and vigorously aided by Mrs. Roosevelt. The loss on this project, which was intended to "rehabilitate" the mountain folk of West Virginia, represented 33 1/3 per cent of the total allotted for it. The loss will be charged to the experimentation of which Mr. Richberg speaks, and to "errors in judgment."

Such an error was the purchase of ready-cut houses in the first group of structures. These houses had to be reinforced and supplied with basements. The Government will lose about \$3,000 on each of the 190 cottages in the project, each of which was offered by the Government at \$4,900! It sounds well, in view of the lectures private industry is so frequently given for its so-called inefficiency. But the houses were supplied with electricity. This means getting away from oil lamp government, and to do so must be cheap, no matter what the price.

Missouri Tells 'Em

Representative Short, Republican, of Missouri, a former clergyman, has drawn heavily on Noah Webster's supply of choice adjectives and nouns to tell members of the House of Representatives, New Dealers, Brain Trusters and Government bureaucrats what he thinks of them. He relieved himself of a carload of unkind words on the floor of the House last week when he objected strenuously to giving the President carte blanche

in the use of the \$4,800,000,000 work relief fund.

Strangely enough, the more he berated the House members for their pliant delegation of power the more the berated applauded. It is likely that a large section of the country would have insisted upon an encore had it heard the torrential flow of words from the irate Missourian. Here's what he said:

"I deeply and sincerely regret that this body has degenerated into a supine, subservient, soporific, superfluous, supercilious, pusillanimous body of nitwits, the greatest ever gathered beneath the dome of our national capitol, who cowardly abdicate their powers and in violation of their oaths to protect and defend the constitution against all of the nation's enemies, both foreign and domestic, turn over these constitutional prerogatives, not only granted but imposed upon them, to a group of tax-eating, conceited, autocratic bureaucrats—a bunch of theoretical, intellectual, professorial nincompoops out of Columbia University at the other end of Pennsylvania Avenue, who were never elected by the American people to any office and who are responsible to no constituency.

"Those Brain Trusters and New Dealers are the ones who wrote this resolution instead of the members of this House, whose duty it is, and whose sole duty is, to draft legislation."

RFC Bill Liberalizes Industrial Loan Provision

Amended to "reasonably assure repayment" instead of requiring "adequate security," the bill extending the life of the RFC two years from Jan. 31 passed the Senate with an amendment liberalizing terms for making direct loans to industry. It is expected to go through the House with the Senate amendment, which was offered by Senator Lonergan of Connecticut.

The amendment, approved by RFC directors, would give the RFC discretionary power as to whether security for industrial loans is such as to "reasonably assure" repayment of the loans. Some Senators, while not objecting to the amendment, saw little difference between it and the original provision. The point also was made that while the RFC was empowered to make direct loans to industry up to \$300,000,000, only relatively little recourse has been made by industry to the loan feature of the act. On Jan. 19 of the current year only 697 direct loans, aggregating \$37,695,735 had been authorized and but \$7,553,488 actually disbursed. There were, however, some 1400 applications for loans made, the total authorized being those for which "adequate security," in the opinion of the RFC, was offered.

Public Works Bill Under Attack

Much criticism has been directed at the \$4,880,000,000 public works employment provision giving to the President dictatorial power as to the expenditure of this vast sum. But the power was left in the bill as it passed the House. Mention of specific projects, such as slum clearance, rural housing, rural electrification, etc., was struck out as was the provision for imprisonment for violating regulations to be issued under the act. The provision for a fine of not more than \$5,000 was continued. The House also struck out the provision giving the President power to postpone termination of Government agencies which are not to be extended beyond June 30, 1937. The changes made leave the President unrestricted use of the large sum for public works. The bill will come under vigorous attack in the Senate.

Gold Clause Gives Country the Shivers

Immediately, the most disturbing thing to the Administration is the pending Supreme Court decision in gold clause cases. If the court holds that Congress had no authority to abrogate the gold clause in public and private contracts, the outstanding debt of these two sources would be kited from \$100,000,000,000 to about \$169,000,000,000! This because the President slashed the gold in a dollar by 40.94 per cent. So if bonds have to be redeemed in gold it would be necessary to pay \$1.69 in devalued currency of today to pay a \$1 debt.

The trail of bankruptcies seen in this has given the Administration and the country the shivers, and Congress is already making moves to forestall such a calamity, one plan being nothing short of calling a constitutional convention to amend the Constitution. The many "curbstone decisions" are to the effect that the Supreme Court will not hold against the Government.

In support of the lay view attention is directed to Supreme Court decision in 1869 upholding the validity of the legal tender acts only in so far as they did not affect obligations of contracts made prior to their passage. But with the appointment of two new justices the decision was overruled one year later and the validity of the act was upheld in its applicability to pre-existing debts. In 1862, as a means of financing the Civil War, Congress had authorized the issuance of \$150,000,000 in Treasury notes and made them legal tender for payment of private debts and public dues, except duties on imports and interest on the public debt.

Labor May Adopt More Militant Policy In Steel and Automotive Unionization

WASHINGTON, Jan. 29.—Dissatisfaction among the most militant leaders in the American Federation of Labor at the failure to unionize the steel and automotive industries is reported to have reached a point where they propose to grasp the reins and to immediately intensify a drive in that direction. While it is understood that the plan contemplates retention of the Amalgamated Association of Iron, Steel and Tin Workers and the Automotive Workers Council, it is said that they would really be put into the background and that the new leaders would direct the drive backstage.

William Green, president of the American Federation of Labor, has also been the object of criticism within the federation as lacking in aggressiveness toward unionization. While he would remain as the nominal head of the federation, the more forceful leaders, it is said, would really assume power. Although the textile industry is rather well organized, it is reported that the plan calls for additional efforts toward unionization in that industry also.

Heretofore there has been much union labor talk of a "triple strike" in the steel, automotive and textile industries. There was from the outset much doubt as to the real seriousness of such a threat. In any event the line of strategy now being considered is said to call for greater militancy in unionizing the automotive and steel industries in particular together with added activity in that direction in the textile industry. The plans, it is reported, will be proposed at a meeting here today of the executive council of the A. F. of L.

Labor Disappointed

Organized labor clearly is disappointed at the showing it has made in both the steel and automotive industries. The more aggressive leaders insist that its unions in those industries should have made much greater headway. They cite as an example the work of John L. Lewis, president of the United Mine Workers of America, who has brought about the almost complete unionization of the bituminous coal industry.

Overwhelmingly outvoted at elections in the automotive industry, organized labor has withdrawn from the Automobile Labor Board, which it wants abolished along

with the proportional plan of representation for collective bargaining. Seeking elections at steel plants, organized labor is fretting because orders for election issued by the National Steel Labor Relations Board are either under suspension by reason of pending court action or otherwise rendered ineffective for the present. Labor leaders are said to feel that the court action will require a prolonged period before final determination is reached and leave the unions high and dry in the meantime.

Legislation On 30-Hr. Week

Much pressure is being brought to bear to get Congress to act on legislation for the 30-hr. week, for abolition of company unions, etc., but whatever Congress may do it is again felt that this will take a much longer time than organized labor cares to wait. Most important, too, is the belief that even if such legislation were enacted by Congress, it would meet with a Presidential veto and could not be overridden.

The proposed mass broadcast to be sent out from Detroit, Feb. 23, over a nation-wide hook-up by the automotive unions is said to be a follow-up on the plan of unionization in the automotive industry and a demonstration of labor's power.

Organized labor also is growling over renewal of the automobile code, Feb. 23. President Green said that the NRA Labor Advisory Board, of which he was acting chairman at its meeting last Thursday, prefers no automobile code to the present one. He said that if the industry proposes renewal of the code without change, "we will suggest that it be dropped. We will then go to Congress to ask for legislation to permit the President to impose a code."

He attacked the merit clause, the hours of work and the rates of pay. These, together with a few simple trade practices, are the only provisions in the automobile code—except Section 7-a. The automobile industry itself is said to be entirely indifferent to renewal of the code and strongly opposed to any changes as to hours and rates of pay and to elimination of the merit clause. This has given rise to the possibilities of a deadlock on renewal of the code, though the general belief is it will be renewed without any changes made in the

provisions which Mr. Green attacked.

There is a possibility of a change, either in the code, or through an understanding between the President and the industry, for greater regularization of production and employment. This point was the object of an elaborate study made by the NRA Research and Planning Division and the Bureau of Labor Statistics, Department of Labor. After going over the report last Thursday, the NLRB sent it to the White House and announcement was made that the board would submit a "covering letter" on the report.

The report is said to carry some sharp criticism of the industry and recommend a plan for its stabilization. This plan, it is said, was discussed at the meeting of the Labor Advisory Board by Secretary of Labor Frances Perkins. She is said to have told of a reported tentative agreement between the industry and the Administration for the bringing out of more models in the early fall, beginning in August. This practice already exists to some extent, but apparently the plan is to expand it. The change would be sufficient, it is said, to bring a rise in seasonal demand for steel from the automotive industry with a greater output of new models.

The report on the automobile industry is said to charge it with an espionage system "worse than that in any other industry." The so-called speed-up system, the report is said to charge, has reached a point where it is inefficient and defeats its own purposes. The system, so the report is said to hold, "makes workers old at 40."

This line of attack coming on the eve of plans to renew the code is out of line with the idea of a capital-labor truce, but organized labor has said the period of the truce, whenever that was, is over. Hence the point may be unimportant. Labor is said to be ready to make the most of the report in its efforts to get concessions for renewal of the code—concessions that the industry apparently will solidly oppose.

Propose Raising of Modernization Loan Limit

WASHINGTON, Jan. 29.—Raising FHA modernization loans from the present limit of \$2,000 to \$50,000 was proposed at a meeting here last week between FHA officials and some 50 industrialists.

An increase in the limit will require action by Congress. The purpose is to permit industrial plants and other large properties to make major improvements through the national housing act.

Administrator James A. Moffett explained that modernization and repair sales schools are to be organized within two or three weeks in 27 key cities throughout the country. He asked those present to lend their best efforts and salesmen to the administration of these schools and likewise sought their aid in a drive to be started this spring to develop thousands of citizens into prospects for modernization and repairs on their property.

Each school, it was stated, will be in the form of a four-lecture course for all building supply and related trades. Assistance was further asked to arouse interest in the Better Housing Campaign among the 10,000,000 members of women's clubs in the nation.

It was prophesied that the volume of insured loans during the normal remodeling months of 1935 would increase to between three and four times the present volume. The conference was told that a real desire was indicated to modernize and repair as a result of a questionnaire recently sent by FHA to 20,000 of the 147,000 manufacturers in the United States. About 24 per cent of those receiving the questionnaire responded.

It was pointed out that the FHA has been allowed \$200,000,000 to insure \$1,000,000,000 in loans under Title I, and if it insured \$500,000,000 in loans it would still not use all of the amount allotted and could utilize the remainder to insure industrial loans of greater amounts.

Among those attending the conference were: Edgar A. Rogers, Republic Steel Corp., Jersey City, N. J.; R. M. Gardner, A. M. Byers Co., Pittsburgh; M. J. Burns, American Radiator & Standard Sanitary Corp., New York; R. A. McAndrews, Holland Furnace Co., Holland, Mich.; N. W. Prentiss, Jr., president, Armstrong Cork Co., Lancaster, Pa.; R. N. Webster, Reynolds Metal Corp., New York; J. F. McNamara and William H. Baldwin, International Nickel Co., New York; C. W. A. Avery, Murray Corp. of America, Detroit; Potter Bowles, Studebaker Sales Corp. of America, South Bend, Ind.; Lewis H. Brown, president, Johns-Manville Corp., New York; A. J. Hettinger, Jr., executive secretary, Durable Goods Industries Committee, Washington; Ralph Kelly, Westinghouse Electric & Mfg. Co., Pittsburgh.

American Chain Applies for Steel Code Labor Provisions — Other News

WASHINGTON, Jan. 29. — Suggestions or objections concerning the application of the American Chain Co., Inc., Monessen, Pa., for exemption from the wage and hours provision of the code for the fabricated metal products manufacturing and metal finishing and metal coating industry, and permission to be bound in all of its labor operations by the code for the iron and steel industry, must be filed with Deputy Administrator H. Ferris White, room 510, 1518 K Street, N. W., Washington, before Feb. 6.

The Roanoke Iron Works, Inc., Roanoke, Va., has made application for an exemption from the Northern wage provisions of the code for the fabricated metal products manufacturing and metal coating and metal finishing industry, and seeks permission to operate under the Southern wage provisions of the code.

COMPLETE WIRE AND IRON FENCE

The supplementary code authority for the complete wire and iron fence industry has made application for approval of its budget and basis of contribution for the period from Jan. 13, 1935, to Jan. 12, 1936. The total budget for the period is \$24,367.75.

WIRE AND IRON FENCE MANUFACTURING

Approval of an amendment to the wire and iron fence industry code, providing for a price-filing system in accordance with NRA policy, has been announced. The amendment was proposed in accordance with Article X of the code. The industry is a division of the fabricated metal products and metal finishing and metal coating industry.

WIRE ROPE AND STRAND

Objections or suggestions concerning the application of the supplementary code authority for the wire rope and strand manufacturing industry, for exemption from the code's wage and hours provisions for those selling direct in the oil country in competition with the members of the American petroleum distributing trade, must be filed with Deputy Administrator H. Ferris White, room 510, 1518 K Street, N. W., before Feb. 11.

PORCELAIN ENAMELING MANUFACTURING

A budget of \$12,000 for the period Jan. 1 to June 16, 1935, has been submitted to NRA by the supplementary code authority for the porcelain enameling manufacturing industry, a division of the fabricated metal products manufacturing and metal finishing and metal coating industry. The code authority proposes an assessment of not more than one-tenth of 1 per cent of the net dollar volume of sales for the year 1934.

REPLACEMENT AXLE SHAFT

Objections or suggestions concerning the proposed \$6,000 budget for the replacement

axle shaft manufacturing industry, subdivision of the automotive parts and equipment industry, for the period from Sept. 1, 1934, to Aug. 31, 1935, must be filed with Deputy Administrator J. G. Roberts, room 4319, Department of Commerce Building, before Feb. 12.

SPECIAL TOOL, DIE AND MACHINE SHOP

The NIRB has approved the application of the code authority for the special tool, die and machine shop industry to expend surplus funds available from its 1934 budget in an amount sufficient to cover expenses from Jan. 1 to March 1, 1935. Expenditures during the period in question were limited to one-sixth of the actual expenses incurred during the budgetary period ending Dec. 31, 1934.

DROP FORGING

Objections or suggestions concerning a proposed amendment to the drop forging code's uniform cost accounting system must be filed with Deputy Administrator W. W. Rose, room 4040, Department of Commerce Building, before Feb. 8.

JOB GALVANIZING

The NIRB has announced a stay of section 1, Article IV, of the code for the job galvanizing metal coating industry, a division of the fabricated metal products manufacturing and metal finishing and metal coating industry, relating to election of a code authority. This article provided that members of the supplementary code authority should be elected at the time of the annual meeting of the National Galvanizers' Association. At the last annual meeting of the association no members of the code authority were elected. Consequently, the temporary code authority, functioning, since the inception of the code, was continued by administrative order until June 16.

ELEVATOR MANUFACTURING

The code authority for the elevator manufacturing industry has made application to the NIRB for approval of an extension of its budget period from March 31 to June 16, 1935, and for certain modifications in the budget, to be effective as of Nov. 1, 1934, which entail changes in budgetary expenses and a proposed reduced rate of assessment.

CODE AUTHORITIES RECOGNIZED

The following members of code authorities have been approved by the NRA:

Anti-Friction Bearing Industry—W. E. Umstatt, Timken Roller Bearing Co., Canton, Ohio; F. G. Hughes, New Departure Mfg. Co., Bristol, Conn.; A. C. Davis, Marlin-Rockwell Corp., Jamestown, N. Y.; G. A. Strom, Strom Steel Ball Co., Cicero, Ill.; H. A. Schatz, Federal Bearings Co., Inc., Poughkeepsie, N. Y.; and F. O. Burkholder, Ahlberg Bearing Co., Chicago.

Construction Machinery Distributing Trade—Carl E. Baker, Smith-Booth Usher Co., Los Angeles, to succeed E. K. Hurst of Sioux Falls, S. D., resigned.

Steel Employment at 409,348 in 1934

THE iron and steel industry employed 409,348 persons in 1934, according to the American Iron and Steel Institute, compared with 338,146 in June, 1933, before the code went into effect. Last year's total payroll was \$457,842,517, or a monthly average of \$38,153,543, compared with \$30,560,761 in June, 1933. Comparable figures for the full year 1933 are not available.

In 1934, the industry's employees worked an average of 30.5 hr. a week, compared with 39.7 hr. in June, 1933, and received an average of 70.2c. an hr., compared with 53c. before the advent of the code.

In December, employment totaled 386,345, against 381,663 in November, and the total payroll was \$35,362,732, compared with \$32,937,099 in the preceding month. Employees worked an average of 28.4 hr. a week in December for an average hourly wage of 72.9c., compared with 27.6 hr. a week for an average return of 72.9c. in November.

Opposes Further Reform Legislation

"WE need relief from further reform legislation and from all such agitation as will cause unnecessary conflict between the many forces which go to make up our national structure of business," said George M. Verity, chairman, American Rolling Mill Co., Middletown, Ohio, speaking recently on the "High Spots of the Business

Situation Since the Recovery Act," before the Cincinnati Association of Credit Men.

"Any further attempt," he said, "to enact legislation along the lines that have already proved their inadequacy or their destructiveness will be disastrous to the interests of every man, woman, and child throughout the nation." Mr. Verity then commented favorably on new channels which have been opened through which business can express its reactions to Washington on developments in the capital.

New York Warehouse Chapter Organized

FORTY warehouse distributors of iron and steel products in the New York district have organized the New York chapter of the American Steel Warehouse Association, Inc., which will supersede the local association that has been in existence for many years.

Harry L. Edgecomb, president, Edgecomb Steel Corp., Newark, N. J., was elected president; H. B. Royer, National Bridge Works, Long Island City, N. Y., and Walter S. Ganong, Edgar T. Ward's Sons Co., Newark, vice-presidents; Charles Kramer, Scully Steel Products Co., Newark, secretary.

Directors include: M. W. Faitoute and B. F. Benedict, Faitoute Iron & Steel Co., Newark; H. B. Ressler and A. E. Jordon, Joseph T. Ryerson & Son, Inc., Jersey City, N. J.; B. F. McCreary, Carroll-McCreary Co., Inc., Long Island City; Joseph Roberts, Edgecomb Steel Corp., Newark, and Lester Brion and P. D. Hager, Peter A. Frasse & Co., New York.

Republic-Corrigan Merger Seems Assured

PROXIES have been received from owners of more than 65 per cent of outstanding preferred stock and more than two-thirds of outstanding common stock of the Republic Steel Corp., in support of the proposed consolidation of Republic and the Corrigan-McKinney Steel Co., T. M. Girdler, president and chairman of the Republic company, announced on Jan. 27. The plan further contemplates acquisition of control of the Truscon Steel Co.

Only a two-thirds vote of each class of stock in support of the plan is required, and the company is confident that proxies covering the remaining small amount of preferred will be received within the next few days.

Mill Orders Placed By Zinc Company

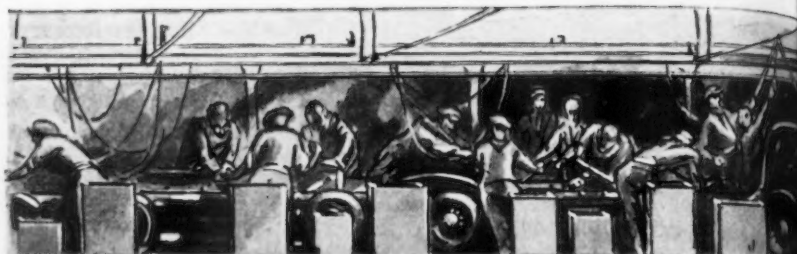
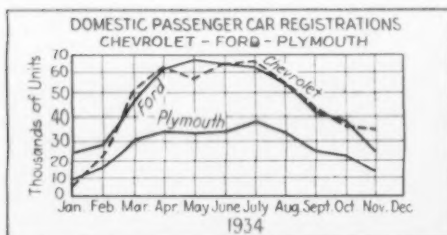
PITTSBURGH, Jan. 29. — The Lewis Foundry & Machine Co., a subsidiary of Blaw-Knox Co., Pittsburgh, has received an order for two additional finishing mills for Ball Brothers Co., for its Muncie, Ind., plant. These mills will be used for rolling zinc sheets.

The Lewis company also has received an order for a three-high mill, complete with tables, from Bethlehem Steel Co., duplicating a mill furnished to this company about a year ago, except that the new mill will be used to manufacture sheet breakdowns up to 60-in. wide.

THE employees' bargaining committee of the Cadillac Motor Car Co., members of which were chosen recently by Cadillac workers at an election held under the direction of the Automobile Labor Board, is shown at its first meeting on Jan. 22. In the election 1176 out of 1593 employees did not specify affiliation with a labor organization. This committee was the first selected under the system of proportional representation established by the President's Agreement last March 25.

—Photograph courtesy Detroit Free Press.





THIS WEEK ON THE A

Car Output Likely to Be Sustained At High Rate Through First Half

DETROIT, Jan. 29.

EVIDENCE is piling up to prove that the current headlong production rush of the motor car industry is no 100-yd. dash, but a long-distance affair. Both dealers and the buying public have been responsive to a flattering degree. It isn't a mere hope of good sales in the spring which is keeping the factories of Southern Michigan at an operating rate taxing their full capacity. It is a demand from dealers for cars for immediate delivery to customers (as illustrated by the large number of 1935 models already seen on Detroit's streets) and for building up stocks to meet an inevitably brisk call from consumers in the months ahead.

A final check-up shows that January assemblies are to be 275,000 to 300,000 units. February stands a good chance of a total of 400,000 units, with a certainty that output will not be less than 360,000. Unless labor trouble interrupts activities, March is destined to move above the 400,000 mark. So will April. May and June admittedly are highly speculative, but it isn't too much to expect the former to yield a production of 375,000 cars and the latter 300,000 to 325,000 units.

The prediction that operations will be maintained at such heights may sound too optimistic until one stops to examine the situation as judged by the industry's past experience. If the above estimates for each of the first six months of 1935 be added together, the total amounts to about 2,160,000 units. The more conservative automotive

executives put the year's production at 3,350,000 units. Thus, approximately 64 per cent of the present year's output would be built in the first half. In the same period of 1934 the proportion was 62 per cent, in 1932 it was 63 per cent, in 1931, 66 per cent and in 1930, 65 per cent. The year 1933, in which only 52 per cent of assemblies for the year were turned out in the first six months, was abnormal and cannot fairly be figured in calculations. The closing of the nation's banks early in March retarded production and sales so that the year's peak did not occur until June and manufacture was sustained at an unusually uniform rate during third quarter.

April Likely To Be Peak Month

Barring strikes, the peak month this year is likely to be April, although May probably will be close to April in volume. April has had the honor of being the top month in four out of the last six years. Should production be delayed by labor difficulties, May, or even June, is likely to supplant April as the premier month.

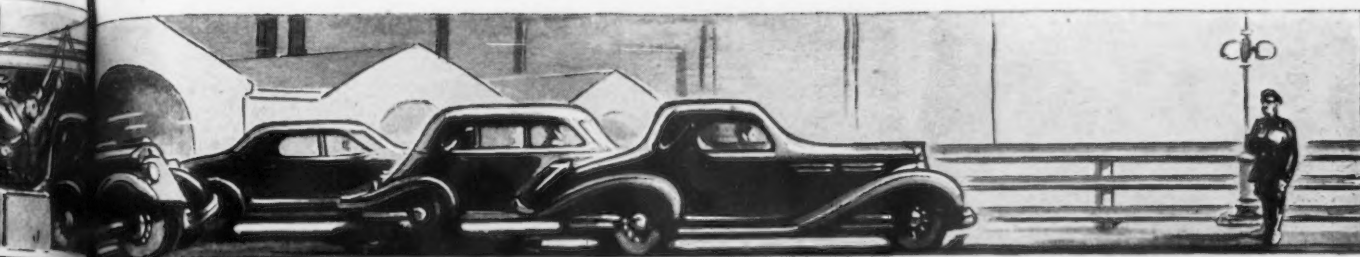
It seems reasonably certain that the steel industry, largely dependent on the motor car industry for support of its present operating rate, can look for continued good business through February and March, with demand not beginning to taper until April. Even if 2,160,000 cars and trucks are manufactured in the first half of the year, or 64 per cent of the estimated 3,350,000 units for the entire year, there will still remain

1,190,000 units to be built in the last half. It should be remembered that each car takes at least a ton of steel.

Releases of cold-rolled sheets have been so heavy that some mills are engaged at full capacity up through March 23, or eight weeks ahead. Hot-rolled sheets, in some cases, are sold almost as far ahead as cold-rolled sheets. Hot and cold-rolled strip mills are crowded with tonnage, but are not in so tight a predicament regarding deliveries as sheet mills. Bar orders likewise have been good, but in a lesser degree than light-rolled products. Stainless steel mills have so much business booked in this district, especially in cold-rolled strip, that they no longer are soliciting orders. In an effort to secure more tonnage as quickly as possible, some car makers have dispatched executives from their purchasing departments to sheet mills.

Factories Relax Inspection Rules

In their desire to push production to higher levels, automobile companies are relaxing their strict requirements regarding material rejections. One prominent manufacturer, which ordinarily rejects all scrapped sheets over 3 per cent broken during drawing operations, has set its deadline temporarily at around 10 per cent. It is said that in one case a company is going to the expense of welding together parts broken in presses because it is so badly in need of this material. Incidentally, this isn't an inference that such parts, after welding, won't stand up in service just as



THE ASSEMBLY LINE

well as parts which went through the drawing operation without breaking. The point is that it is profitable at the moment to spend money on welding together split sheets rather than risk delay by rejecting them, as ordinarily would be done.

Equipment Buying

A car manufacturer outside Detroit, who is planning on introducing 1936 models in midsummer, has placed initial orders in its tool and die program. Expenditures thus far are said to have been about \$75,000. Equipment purchases in connection with this company's model changes will not be made for several weeks, and it appears doubtful whether the capital outlay for this purpose will be large.

The strike in the Pittsburgh Plate Glass Co., which threatens to extend to Libby-Owens-Ford at Toledo, is not affecting motor car production and will not interfere with assemblies unless it is prolonged for several weeks. In case of an extended tie-up, Ford is in a position to make its own glass in a plant at Rouge which has been idle for some time.

Stout Presents Rear-Engine Car

With plans afoot for building 100 cars this year, William B. Stout will announce, the coming week-end, his new rear-engine car, to be called the Stout Scarab because of its resemblance to the Egyptian beetle. Powered by a 100-hp. Ford V-eight engine, the car is built on a frame of alloy steel tube hoops. Taking a leaf from the airplane industry's notebook, Mr. Stout designed the frame on the basis of airplane stress analysis plus crash strength. Traditional running boards are eliminated, this space becoming a part of the floor, which is continuous across at the usual running-board height. Because of this treatment, there are 5 in. more headroom in the car than in the conventional

By BURNHAM FINNEY

Detroit Editor, *The Iron Age*

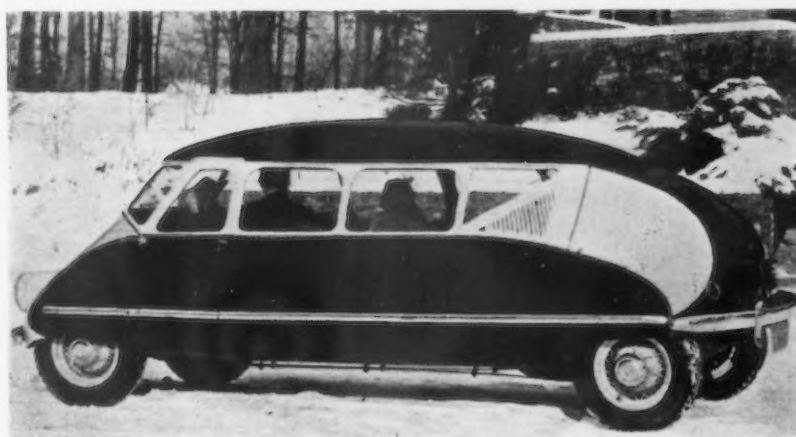
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type, although the roof is at the usual height.

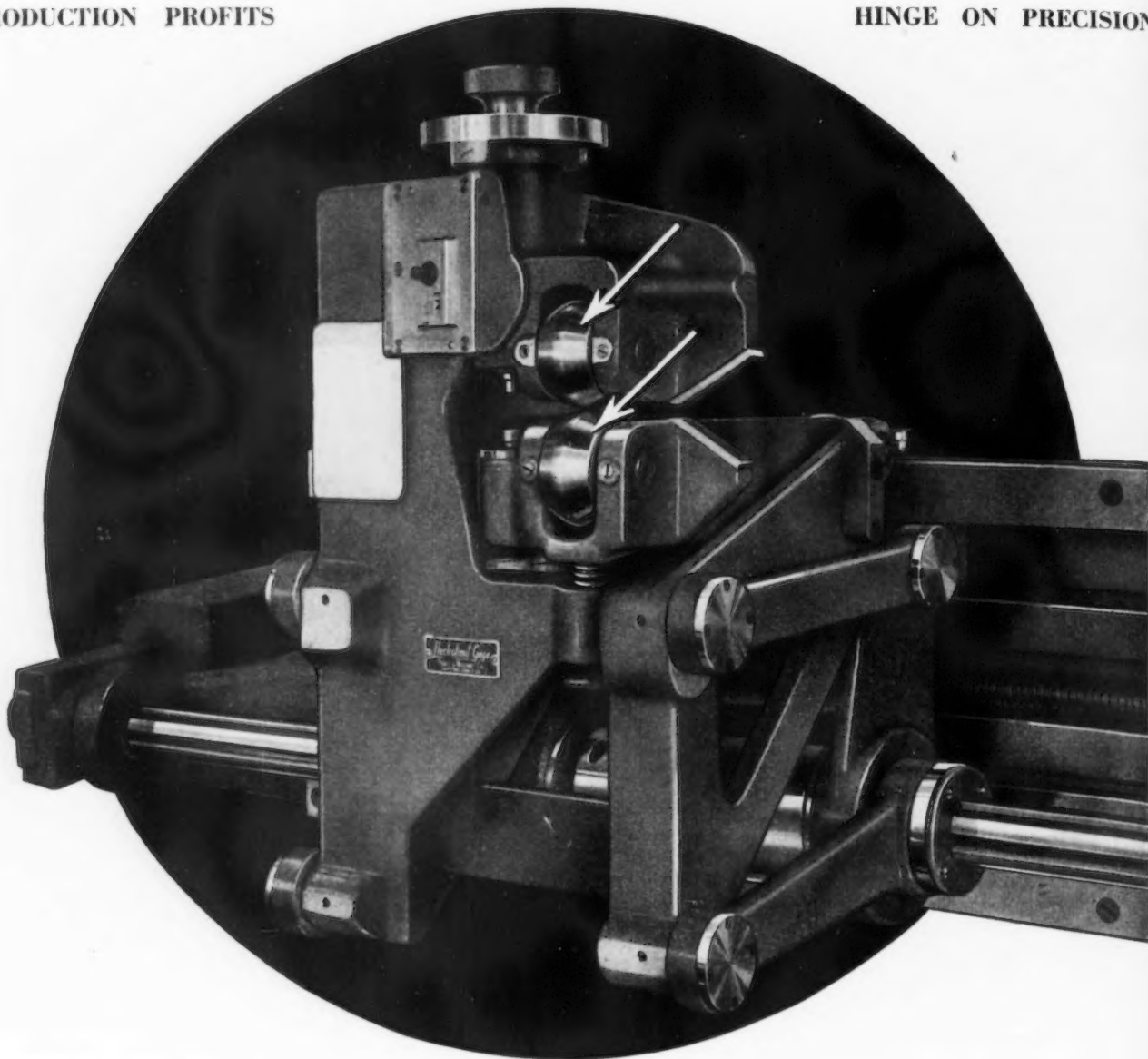
At the front of the car, almost directly over the front wheels, is the windshield and below it the instrument board. The driver's seat at the left is adjustable in all directions and to all angles, but fastened to the floor. The chair next to it is not fastened, but can be turned around to any direction or location. At the rear, just forward of the rear wheels and opposite the door, is a wide overstuffed cross-seat, almost like a lounge. Behind it is a wide shelf for storage purposes. Between the rear seat and the front seats are a folding table fitting into the wall and a chair which may be moved to any position, such as facing the table. The rear seat may be taken from its regular position and placed

alongside the wall with an extension which folds out of the wall, making a full-length sleeping couch.

The support for the body is materially above its center of gravity, giving the car a tendency to pendulum and "bank" on turns. This side stability, plus the use of a spring suspension consisting of an airplane landing gear on all four wheels, eliminates all quick road shocks. The suspension system includes coil springs with large oil cylinders to absorb shocks. These cylinders extend up above the axle to a point on the level with the lower window line. Fuel tank has capacity for 300-mile runs. Controls, such as gear shift, pedal location and steering gear, are conventional. Power brakes are standard equipment. The engine at the rear occupies the space of the usual trunk rack. The engine is driven through a selective gear mechanism to the rear axle, the axle ratio being more nearly direct than usual. The car is no longer than a V-eight Ford and is said to weigh about 1800 lb.



WILLIAM B. STOUT'S new rear-engine car is known as the Scarab because of its resemblance to the classic Egyptian beetle. Built on a frame of alloy steel tube hoops, it has a spring suspension consisting of an airplane landing gear on all four wheels, including coil springs with large oil cylinders to absorb shocks. The body is suspended between its supports somewhat like a hammock, the weight being below the points of suspension.



**These rolls measure accurately the thickness
of cold strip coming off the mill at
1000 feet a minute**

PW Cold strip mills become high speed machines when the P&W Electrolimit Gage goes to work. There is no slowing down or stopping to check strip thickness. This new gage measures every inch of strip, and shows its exact thickness greatly magnified on a big dial. The operator sees instantly any deviation from accurate limits. The result is a far more uniform, accurate strip, *produced at a thousand feet a minute and more.*

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THE PRATT & WHITNEY
..... ELECTROLIMIT GAGE

SUMMARY OF THIS WEEK'S BUSINESS

Output Reaches 56 Per Cent But Scrap Suffers First Setback Since September

Steel Production Rises Sharply at Chicago, Pittsburgh and Detroit—Scrap Declines at Chicago and Pittsburgh and Composite Falls to \$12.17

STEEL ingot production has risen $4\frac{1}{2}$ points to 56 per cent of capacity, continuing the upward trend which has been interrupted only once since its inception in the second week of September. Scrap, as measured by THE IRON AGE composite price, has dropped to \$12.17 a gross ton, after having remained stationary at \$12.33 for three consecutive weeks. Recessions in heavy melting steel at both Pittsburgh and Chicago contributed to the decline, which is the first setback the index has suffered since the last week in September, 1934.

Blast furnace resummptions, an increased flow of scrap from the country and heavier industrial production of old material are among the factors held responsible for the downturn in scrap. There is as yet little disposition to look for an early recession in steel works' operations, although it is conceded that further gains may not carry output more than five or 10 points higher. In 1934 the scrap composite reached its peak at \$13 in the second week in March, while ingot output reached its zenith at 61 per cent in the third week in May and again in the second week in June.

This year there has been much less speculative buying of iron and steel than a year ago. Moreover, the automobile makers, as well as the farm equipment industry and various miscellaneous lines of manufacture, are apparently headed for the highest operations in four or five years.

JANUARY motor car assemblies will range from 275,000 to 300,000 units. February output is expected to approach 400,000 and, unless labor trouble intervenes, the March total will exceed 400,000. Ford's production at Rouge is now between 5000 and 6000 units a day and this rate will be raised until a maximum of 8000 is attained in March.

Detroit district offices of sheet and strip mills have accumulated the largest January bookings in five years. Releases of cold-rolled sheets have been so heavy that some mills are engaged at full capacity for eight weeks ahead. Total sheet orders entered in the past week by one of the leading producers of the country were the largest, with one or two exceptions, for any week since 1931. Average operations of sheet mills, strip mills and tin plate plants are now fully 65 per cent of capacity.

WITH deliveries extending, especially on the lighter rolled products, buyers are no longer insisting on such prompt service, but in few cases is there any disposition to make speculative commitments.

Makers of galvanized sheets are beginning to receive sizable orders from manufacturers of roofing, eaves-trough and other building materials. Producers of wire products continue to find shipments in excess of output despite repeated increases in their operating rate.

PITTSBURGH steel putput has been helped by the recent Norfolk & Western rail order. The outlook for additional rail business is still uncertain. Although the Federal Government is expected to set aside \$300,000,000 to finance railroad rehabilitation work, the carriers are likely to borrow more freely to finance railroad equipment programs than to purchase rails. In either case, however, the mills will benefit from orders for much needed tonnage in heavy rolled products.

Structural steel awards of 5250 tons are the smallest since the first week in December. New projects of 9400 tons compare with 16,150 tons last week and 19,700 tons two weeks ago. Structural steel contracts in January totaled 55,850 tons as against 31,500 tons in December and 64,025 tons in November. Bids on 7030 tons of reinforcing bars will be taken Feb. 11 by the Los Angeles water district. The Trans-Bay viaduct, San Francisco, will require 3335 tons of bars, while 3580 tons will be bought for enlarging the Moffatt tunnel west of Denver.

The Navy Department has opened bids on 1450 tons of armor plate for three cruisers.

The iron and steel industry employed 409,348 persons in 1934 as compared with 338,146 in June, 1933, before the code went into effect. The payroll last year was \$457,842,517, or \$38,153,543 monthly, against \$30,560,761 in June, 1933. Employees in 1934 worked an average of 30.5 hr. a week and received an average of 70.2c. an hour, as compared with 39.7 hr. and 53c. an hour in June, 1933.

STEEL output is up six points to 42 per cent at Pittsburgh, eight points to 67 per cent at Chicago, one point to 36 per cent in the Philadelphia district, three points to 46 per cent at Buffalo, 24 points to 100 per cent at Detroit and four points to 29 per cent in the South. Operations are unchanged at 95 per cent in the Wheeling district, 63 per cent in the Valleys and 67 per cent in the Cleveland-Lorain area.

THE IRON AGE composite prices for pig iron and finished steel are unchanged at \$17.90 a ton and 2.124c. a lb. respectively.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	Jan. 29, 1935	Jan. 22, 1935	Dec. 31, 1934	Jan. 30, 1934
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$20.26	\$20.26	\$20.26	\$19.26
No. 2, Valley furnace.....	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti.....	19.13	19.13	19.13	18.13
No. 2, Birmingham†.....	14.50	14.50	14.50	13.50
No. 2 foundry, Chicago*.....	18.50	18.50	18.50	17.50
Basic, del'd eastern Pa.....	19.76	19.76	19.76	18.76
Basic, Valley furnace.....	18.00	18.00	18.00	17.00
Valley Bessemer, del'd P'gh.....	20.76	20.76	20.76	19.76
Malleable, Chicago.....	18.50	18.50	18.50	17.50
Malleable, Valley.....	18.50	18.50	18.50	17.50
L. S. charcoal, Chicago.....	24.04	24.04	24.04	23.54
Ferromanganese, seab'd car- lots.....	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Finished Steel	Jan. 29, 1935	Jan. 22, 1935	Dec. 31, 1934	Jan. 30, 1934
<i>Per Lb.:</i>				
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary.....	2.50	2.50	2.50	2.35
Sheets, galv., No. 24, P'gh.....	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary.....	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh.....	1.85	1.85	1.85	1.75
Hot-rolled sheets, No. 10, Gary.....	1.95	1.95	1.95	1.85
Wire nails, Pittsburgh.....	2.60	2.60	2.60	2.35
Wire nails, Chicago dist. mill.....	2.65	2.65	2.65	2.40
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.20
Plain wire, Chicago dist. mill.....	2.35	2.35	2.35	2.25
Barbed wire, galv., P'gh.....	3.00	3.00	3.00	2.85
Barbed wire, galv., Chicago dist. mill.....	3.05	3.05	3.05	2.90
Tin plate, 100 lb. box, P'gh.....	\$5.25	\$5.25	\$5.25	\$5.25

Scrap

Per Gross Ton:

Heavy melting steel, P'gh.....	\$13.25	\$13.50	\$13.25	\$13.25
Heavy melting steel, Phila.....	11.75	11.75	10.75	11.75
Heavy melting steel, Ch'go.....	11.50	11.75	11.25	10.75
Carwheels, Chicago.....	12.00	12.00	11.50	11.00
Carwheels, Philadelphia.....	10.75	10.75	10.75	12.75
No. 1 cast, Pittsburgh.....	13.75	13.25	12.75	12.25
No. 1 cast, Philadelphia.....	11.00	11.00	11.00	12.50
No. 1 cast, Ch'go (net ton).....	10.00	11.00	10.25	9.50
No. 1 RR. wrot., Phila.....	11.25	11.25	11.25	11.00
No. 1 RR. wrot., Ch'go (net).....	10.50	10.50	10.00	9.25

Coke, Connellsville

Per Net Ton at Oven:

Furnace coke, prompt.....	\$3.85	\$3.85	\$3.85	\$3.50
Foundry coke, prompt.....	4.60	4.60	4.60	4.25

Metals

Per Lb. to Large Buyers:

Electrolytic copper, refinery.....	8.75	8.75	8.75	8.00
Lake copper, New York.....	9.12½	9.12½	9.12½	8.25
Tin (Straits), New York.....	50.95	51.15	50.75	51.62½
Zinc, East St. Louis.....	3.70	3.75	3.72½	4.30
Zinc, New York.....	4.05	4.10	4.07½	4.65
Lead, St. Louis.....	3.55	3.55	3.55	3.90
Lead, New York.....	3.70	3.70	3.70	4.00
Antimony (Asiatic), N. Y.....	14.50	14.50	13.87½	7.15

Rails, Billets, etc.

Per Gross Ton:

Rails, heavy, at mill.....	\$36.37½	\$36.37½	\$36.37½	\$36.37½
Light rails, Pittsburgh.....	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh.....	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh.....	28.00	28.00	28.00	26.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh.....	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh.....	38.00	38.00	38.00	36.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.....	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:

	Cents	Cents	Cents	Cents
Bars, Pittsburgh.....	1.80	1.80	1.80	1.75
Bars, Chicago.....	1.85	1.85	1.85	1.80
Bars, Cleveland.....	1.85	1.85	1.85	1.80
Bars, New York.....	2.13	2.13	2.13	2.08
Plates, Pittsburgh.....	1.80	1.80	1.80	1.70
Plates, Chicago.....	1.85	1.85	1.85	1.75
Plates, New York.....	2.08	2.08	2.08	1.98
Structural shapes, Pittsburgh.....	1.80	1.80	1.80	1.70
Structural shapes, Chicago.....	1.85	1.85	1.85	1.75
Structural shapes, New York.....	2.05½	2.05½	2.05½	1.95½
Cold-finished bars, Pittsburgh.....	2.10	2.10	2.10	2.10
Hot-rolled strips, Pittsburgh.....	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh.....	2.60	2.60	2.60	2.40

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

The Iron Age Composite Prices

Finished Steel

Jan. 29, 1935	2.124c. a Lb.
One week ago	2.124c.
One month ago	2.124c.
One year ago	2.008c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

Pig Iron

\$17.90 a Gross Ton
17.90
17.90
16.90

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

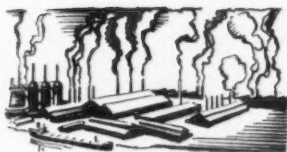
Steel Scrap

\$12.17 a Gross Ton
12.33
11.75
11.92

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1934	2.199c., April 24;	2.008c., Jan. 2	\$17.90, May 1;	\$16.90, Jan. 27	\$13.00, Mar. 13;	\$9.50, Sept. 25
1933	2.015c., Oct. 3;	1.867c., April 18	16.90, Dec. 5;	13.56, Jan. 3	12.25, Aug. 8;	6.75, Jan. 3
1932	1.977c., Oct. 4;	1.926c., Feb. 2	14.81, Jan. 5;	13.56, Dec. 6	8.50, Jan. 12;	6.42, July 6
1931	2.037c., Jan. 13;	1.945c., Dec. 29	15.90, Jan. 6;	14.79, Dec. 15	11.33, Jan. 6;	8.50, Dec. 29
1930	2.273c., Jan. 7;	2.018c., Dec. 9	18.21, Jan. 7;	15.90, Dec. 16	15.00, Feb. 18;	11.25, Dec. 9
1929	2.317c., April 2;	2.273c., Oct. 29	18.71, May 14;	18.21, Dec. 17	17.58, Jan. 29;	14.08, Dec. 9
1928	2.286c., Dec. 11;	2.217c., July 17	18.59, Nov. 27;	17.04, July 24	16.50, Dec. 31;	13.08, July 2
1927	2.402c., Jan. 4;	2.212c., Nov. 1	19.71, Jan. 4;	17.54, Nov. 1	15.25, Jan. 11;	13.08, Nov. 22

Pittsburgh Output Up Six Points to 42 Per Cent



Sheet, Strip and Tin Mill Operations
Average 65 Per Cent — Rail Order
Aids District — Steel Scrap Declines

PITTSBURGH, Jan. 29.—Sustained operating schedules at most small independent mills and plans for heavier output among leading producers in the Pittsburgh district this week will boost raw steel output six points to 42 per cent of capacity, representing an uninterrupted advance for the past six weeks. This week's gains are chargeable to fair engagement of the local rail mill, which has begun production against the Norfolk & Western rail order for 24,000 tons, and to a strong movement of sheet bars to detached sheet mills and for tin plate conversion. Schedules, in addition to being well supported by heavy orders for sheets, strip and bars from the automotive industry, are also relying on a steady influx of miscellaneous steel business.

Finished steel orders booked by Valley and northern Ohio producers still are in sufficient volume to maintain last week's rate of 63 per cent. Production in the Wheeling district remains unchanged at 95 per cent. The most notable improvement in demand has been in full-finished sheets for automotive consumption.

Sheet mill operations this week will average five points higher at 65 per cent. A like increase is recorded in tin plate for the current period. Strip steel production, which is feeding largely on automotive business, also will average about 65 per cent this week.

The range for No. 1 heavy melting steel at Pittsburgh has narrowed to \$13.00 to \$13.50, delivered.

Pig Iron

Merchant producers in this district are experiencing an improvement in small-lot demand for foundry grades. Furnace order books, however, are quite bare of backlog tonnage, since practically all business is for prompt delivery. A heavier movement is in progress to ingot mold plants, whose schedules recently have been stepped up. The present contractual set-up for pig iron is restricting the movement of steel-making grades, and few, if

any, large non-integrated mills have made overtures for covering ahead on a large scale for many months. Relining of the Neville Island stack will prevent resumption of operations probably for another 60 days.

Semi-Finished Steel

This market is benefiting indirectly by heavy automotive demand and sustained activity in the tin plate industry. Sheet bars for tin plate mills and for sheet mills are in heaviest demand. Automotive activity also is indirectly sustaining interest in forging billets. Skelp and wire rods are holding their own.

Bolts, Nuts and Rivets

Releases on first quarter contracts are not appearing frequently. There is no significant movement to shipyards or railroad construction shops. Growing interest among the carriers in freight cars may materialize in some bolt and nut business later in the first quarter.

Rails and Track Accessories

The local rail mill this week will start rolling on the Norfolk & Western rail order for 24,000 tons. New orders have been routine in character and for spot requirements. It is possible that the Government will soon endeavor to promote capital goods purchasing by the carriers by making available low-interest or interest-free funds. Approximately \$300,000,000 of Reconstruction Finance Corp. funds is reported to have been earmarked for railroad loans, but thus far has not tempted any of the carriers.

Reinforcing Steel

New bids are being taken until Feb. 5 by the United States Engineer's Office, Zanesville, Ohio, on 2400 tons for Muskingum Valley dams. Previous bids for that project, which originally specified only 1000 tons, were rejected. Some orders for road construction have reached mills through distributors. Private work still is spotty. Dis-

tributers' stocks generally are believed to be rather ample in anticipation of the spring demand. Prospects for any early benefit from the Allegheny County Authority construction program are dampened by the expectation of considerable legal entanglements before work actually gets under way.

Bars

Strong demand continues from automotive centers, with satisfactory support from miscellaneous consuming sources. There is little indication of consumer stocking, and merchant bar mills are pointing to sustained engagement at the present rate.

Cold Finished Bars

Although aggregate volume has not increased perceptibly in the past week, the cold-drawing industry has been encouraged by the more diversified character of orders. Practically all consuming lines have appeared in the market since the beginning of January. The jobbing trade is now the only notable laggard.

Wire Products

Mill schedules of about 35 per cent of capacity in this district continue to rely heavily on automotive orders for manufacturers' wire. Interest from the farm regions is in greater evidence, but orders for seasonal activity in the spring have not materialized thus far. Jobbers are not displaying unusual interest in merchant items.

Tubular Products

A slight pause is noticeable in demand for oil-country goods, which have followed an even keel for several months. In the face of increased drilling and fairly satisfactory conditions in the oil industry, local pipe producers believe that the let-down will be short-lived. Other tubular goods are not unusually active, but continue to be in steady demand. Activity in the automotive industry is sustaining demand for mechanical tubing. Orders for stationary pipe, despite reports of increased housing activity, are not in noticeably heavier volume.

Sheets

A rather broad improvement in demand appeared in the past week. Again automotive requirements represent nearly one-half of current demand, while purchases by farm equipment makers and gas and electric stove manufacturers are important in the miscellaneous groups. Specifications from refrigerator makers are steady. Sheet

orders received by a leading producer in the past week equaled, with the possible exception of one or two weeks, volume in any period since 1931. A higher rate among full-finishing units has boosted average operations for the sheet industry to 65 per cent. Practically all current shipments are for immediate consumption. Some finishes of sheets cannot be delivered until early March.

Tin Plate

Specifications for general line cans have increased and account for a strong 65 per cent average for tin plate operations in the current period. Several independent producers in this district will be engaged at capacity this week, while rolling at other mills will at least match the recent pace. In many instances specifications are for prompt shipment, but a fair share of current output is produced against orders for later shipment. Backlogs are beginning to look healthier.

Strip Steel

Hot and cold-rolled strip production is tending higher at about 65 per cent. Automotive demand for cold-rolled stock is taxing some mills to operating limits, and in many instances deliveries cannot be promised for earlier than late February. Miscellaneous requirements have not declined, and strip mills continue to build moderate backlogs on such tonnage as can be shipped later on. In few instances, however, are consumers noticeably stocking strip.

Plates and Shapes

Several tentative barge inquiries are sustaining hopes for resumption of activity at barge yards, but for the time being the movement of plates for new river craft is at a minimum. Increased interest in freight car requirements among several carriers may soon be translated into a heavier demand for plates. The structural steel market remains colorless. All new awards reported in this district are for State highway projects. New work includes high schools at Tottenville, Staten Island, New York, and at Bayonne, N. J., requiring 1200 tons and 700 tons of structural steel respectively. The Tennessee Valley Authority has issued specifications for service and emergency gates at Sheffield, Ala., which will take 1200 tons.

Coke and Coal

This market seems to be more sensitive to unseasonal warm weather than to cold snaps. In the

past week of severe weather conditions, fuel demand failed to expand to a point where mines benefited noticeably. Movement of domestic coke out of this district to the Eastern seaboard has been further depressed by foreign competition, which is largely German coke. The German coke is reported to be quoted at \$6.40 a net ton alongside, seaport, a price too low to permit competition from Pittsburgh district coke. Foundry coke shipments are slightly heavier. Consumption of blast furnace coke is increasing, but the market has been devoid of any major contracting.

Scrap

With ordinary No. 1 heavy melting steel slightly easier, this market reflects nervousness. Any weakness, however, is more apparent than real. A mill in the Pittsburgh district this week paid \$13.25 for a moderate tonnage of No. 1 heavy melting steel and \$12.25 for No. 2 steel. Brokers are not generally willing to sell ordinary No. 1 steel at less than \$13.50. There is little consumer interest in the current market. In the meantime ordinary steel scrap is more freely available from small yard dealers, and brokers with old orders are able to cover in most instances profitably. There is little doubt that the entire market would prove sensitive to a renewed consumer demand, which, however, would unquestionably have to include activity in the Wheeling district, where, for the time being, at least one mill has withdrawn from the market. The tendencies of other grades on the list belie any general softness in this market. Scrap rails are commanding a substantial premium over No. 1 steel. Blast furnace grades are slightly higher, while No. 1 cast again has advanced 50c. a ton. A similar rise is noted in railroad specialties. The current Baltimore & Ohio scrap list, which closes on Feb. 4, covers 5575 tons, including 1200 tons of No. 1 steel.

Snow Cripples Scrap Movement at Boston

BOSTON, Jan. 29.—For a week yards and terminals have been endeavoring to rid themselves of the greatest fall of snow experienced in this territory in many years. Naturally the movement of scrap has been badly crippled, and indications are conditions will be unfavorable for another week or ten days. Loading of two steamers here, and one at Providence, R. I., for export has been held up, and

virtually nothing was moved by rail to domestic consuming points the past week. A second steamer is tied up at Providence awaiting 1000 tons of No. 2 cast before proceeding to this port. Aside from a slight boost in prices offered by the American Steel & Wire Co., Worcester, Mass., for scrap, no change is noted in quotations. The Worcester consumer is now offering \$8.25 to \$8.40 a ton, delivered, for No. 2 steel, and around \$9 for No. 1 steel. Local brokers are talking easier prices, but still hold to former prices.

Business in pig iron has been confined to a few carlots. However, up to the time of the snowfall, industrial New England was growing more active, particularly in the electrical equipment and automobile parts fields. Manufacturers of valves, small tools, jigs and dies also were doing much better. Furnace representatives, therefore, expect some pickup in pig iron sales before long.

Buffalo Operations in Further Gain

BUFFALO, Jan. 28.—Steel production in this district has registered another gain. Wickwire-Spencer Steel Corp. is operating two open-hearths, the Lackawanna plant of the Bethlehem Steel Corp., ten; Republic Steel Corp., five. The Seneca sheet division of Bethlehem is running at about 60 per cent of capacity.

Blast furnace operations are unchanged, though one of the stacks of the Hanna Furnace Corp. is being prepared for lighting. This may not occur, however, for another six weeks. Pig iron business is in good volume and steadily improving.

Two or three school jobs are occupying the attention of structural steel fabricators. Bids will be taken Feb. 4 for a school at Wilson, N. Y., and bids in February or March for a high school in Olean, N. Y. The first job will require 100 tons of steel; the second, 800 tons. Bids will be taken on a 50-ton job, a school at Machias, N. Y., Jan. 28.

The scrap market has again advanced. One mill acquired a lot of 3000 to 4000 tons of No. 1 and No. 2 heavy melting steel at \$12.50 and \$11.50 respectively. Another large consumer purchased a considerable tonnage at \$12.50 and \$10.50 respectively.

Chicago Rate Mounts Eight Points to 67 Per Cent



Leading Producer Lights Another Blast Furnace—Demand Becomes More Diversified—Pig Iron Shipments 75 Per Cent Ahead of December

CHICAGO, Jan. 29.—Despite all adverse influences, such as the threat of labor disturbances and careless legislation, the demand for steel continues not only to increase but the week's performance shows an accelerating rate of gain. Ingot output has risen eight points to 67 per cent of capacity, and once again new sales and specifications give support to the belief of producers that the peak has not been reached. Increased demand is coming from all directions, with an unusual expansion in business from miscellaneous small users. The whole situation is well illustrated by the fact that wire mills, despite heavier production, are still being forced to draw on stocks, and in several important products almost all current orders are being entered without restrictions as to shipping dates.

The leading producer is lighting another blast furnace at Gary works, making a total of three added in about 10 days. Another producer will bring in a blast furnace at the opening of the new month.

The Milwaukee Road and the Illinois Central have been added to the list of prospective buyers of rails. Many in the local steel trade believe that the 1935 railroad equipment program will be more important than the rail tonnage.

The scrap market is moving contrary to steel. Heavy melting steel prices have lost ground by 25c. a ton and other grades are also weaker. Recent high prices started the flow of country scrap, much of which was caught in transit by sub-zero weather. Moderate weather has released those tonnages which in recent days have appeared on track in Chicago and they have disturbed the market.

Pig Iron

January shipments of pig iron are fully 75 per cent ahead of December and orders now on books point to a still larger movement in February. Shipments are the best since last June, and previous to

that it is necessary to go back to 1930 to find a month comparable with January.

Reinforcing Bars

Cold weather of unusual severity has put an effective end to concrete pouring. Not only are inquiries and sales sluggish but shipments against old orders are at a low point. The bulk of inquiries is for post offices and postal substations, all of which are small. Bids will be taken Feb. 4 on 2500 tons for side dams at Zanesville, Ohio. The Sanitary District, Chicago, is preparing additional plans, and Milwaukee will again take bids on 4000 tons.

Cast Iron Pipe

Extreme cold weather and an out-of-season period are combining to make this market very dull. At that, however, small miscellaneous business is in better volume than a year ago in January. The volume of work on which sellers have quoted is large and the outlook for spring shipments is good.

Rails

It is believed by the trade that the Burlington may enter the market any day for its 15,000 tons of rails and 4000 tons of accessories. This tonnage does not measure the full extent of track work to be undertaken by that railroad for the reason that it still has a sizable tonnage of rails taken against old contracts. The New York Central has obtained its loan and is expected to advertise at an early date for 20,000 tons of rails. Other purchases that appear to be near at hand are to be made by the Milwaukee Road and the Illinois Central. Light rail orders, though small in the aggregate, are in better total volume and the last week has witnessed a broader movement of track accessories that must be used irrespective of weather conditions.

Wire Products

Output has been raised at least five points to 50 per cent of capacity

and producers find that shipments are still in excess of output. This is a condition that has existed for a month or more and it cannot be permitted to run much longer, for the reason that stocks must be built and rounded out for spring deliveries the start of which is now only a matter of a few weeks in the future. Current demand is well spread, with automobile and farm implement manufacturers still pressing for material. The railroads are sending out inquiries again, and jobbers are working out of their "over bought" situation.

Cold Rolled Strip

Demand continues to broaden. Much special work is being ordered and some producers are considering new and special equipment in order to fill these needs.

Sheets

Many cold-rolling departments are operating close to capacity and in such cases sellers are choosing the added business offered them. Demand for hot-rolled products is better and roofers in the South and Southwest are taking the galvanized product in increasing quantities. Many container manufacturers report improvement in business.

Structural Material

A bridge inquiry for 2300 tons from the State of Illinois takes the lead as to size among fresh inquiries. Bridges and dams make up the bulk of remaining inquiries. New projects total 5500 tons, of which only 650 tons is to be used in private contracts. Awards are accounted for in large part by a 2000-ton building on the Pacific Coast and a 1400-ton bridge in Oklahoma.

Plates

The general run of plate business is improved, but the total tonnage is pitifully small in contrast with activity in other finished steel products. It is reported that two tanks have been ordered at Houston, Tex., and a Wausau, Wis., manufacturer has placed 850 tons for tanks. Sand pipe to be shipped to Fort Peck, Mont., calls for 1050 tons, and tanks weighing 200 tons are to go to Boulder City, Nev.

Scrap

Weakness has again gripped this market, and heavy melting steel has been taken by a mill at \$11.75 a gross ton, delivered, or 25c. below the last previous purchase. The end of cold weather has released a large number of cars that caused congestion on mill switching tracks. From this situation arose a troublesome tonnage that was in all essentials distressed.

Steel Bookings Continue To Rise at New York



Tin Plate Demand Is Conspicuous—
Railroads Show More Interest in the
Market—Large Sale of Scrap to Italy

NEW YORK, Jan. 29.—Steel bookings in the New York district for this month promise to exceed those of December by a comfortable margin, thus carrying forward an unbroken record of improvement for each month since August. This area has not benefited directly from the gain in automobile production and increases in steel commitments have therefore been less spectacular than in the Central West. Miscellaneous demands, however, are showing a steady, though gradual, increase, and will doubtless expand further, particularly if there is continued growth of general business activity. Jobbers' stocks, as well as the inventories of manufacturers, are still low, indicating that most current shipments are passing quickly into consumption.

Among individual commodities, tin plate still stands out as the most active. With the Hawaiian pineapple season at its height, can companies are specifying more freely. The growth of the grapefruit juice canning industry and experimental production of beer cans have also stimulated tin plate releases.

Increasing traffic is causing railroads to give more thought to the rehabilitation of their equipment and track. The Southern Railway Co. is considering the purchase of 300 40-ton automobile cars and the Atlantic Coast Line contemplates buying 5000 tons of rails.

The New York Central's steel requirements for the air conditioning of 182 passenger cars were covered in Clayton Act bids taken late in December. The tenders on this steel, however, were thrown out and new figures will be asked for.

The New York Central has awarded general contracts for two sections of its improvement program on the west side of Manhattan. Poirier & McLane Corp., New York, has the contract for track elevation between Seventy-second and Seventy-ninth Streets, requiring 8000 tons of steel, and P. T. Cox Contracting Co., New York, has the award for depressing

tracks between Forty-second and Fifty-third Streets, calling for 1650 tons.

Rio de Janeiro, Brazil, is in the market for a fabricated pipe line requiring 12,500 tons of ingot iron plates.

A local scrap broker has sold 50,000 tons of No. 2 heavy melting steel for delivery to Italy.

Pig Iron

Foundry operations have recovered somewhat from the December slump and activity in this district is at about 50 per cent of capacity. Jobbing business has picked up slightly, and there are isolated instances of better production in the foundries of machine makers. However, this means little to the iron seller, even though consumers' stocks are light. All price uncertainties have been removed from the market, and users are only interested in carload lots to cover the estimated needs of the immediate future. The quantity of this type of orders is still far from sufficient to be spread satisfactorily among all furnaces. Total bookings for the past seven-day period amounted to 1100 tons, as compared with 1250 tons in the preceding week and 1800 tons sold a fortnight ago.

Reinforcing Steel

Miscellaneous buying continues at a low level, and there are so few projects maturing that sellers expect no lift in business in the weeks immediately ahead. The two large outlets of reinforcing steels are the building trades and highway construction. New building is practically at a standstill in this district, and highway projects in New York and adjoining states are being postponed until spring. Former tenders for Tri-Borough Bridge piers have been cancelled; the 750 tons of bars required for this work will be re-bid on Feb. 14.

Scrap

Cold weather and heavy snowfall in this district are seriously hampering scrap loadings, and the

tempo of the whole industry here is slower. Brokers continue to offer at least \$9 and \$7.50 a ton for No. 1 and No. 2 steel respectively, delivered alongside barge. The prices on railroad cars for these grades are nominally 50c. a ton higher on the strength of consumer prices in the Pittsburgh and Philadelphia areas. All other scrap items are quatably unchanged and only occasionally active. New foreign business is coming into the market regularly. Luria Brothers & Co., Inc., has sold 50,000 tons of No. 2 steel for Italian delivery, and about 20,000 tons of additional No. 1 steel for Japan was placed during the week. A few English inquiries for stove plate and cast are in the market, and additional Polish business will probably be placed shortly.

Large Scrap Purchase At St. Louis

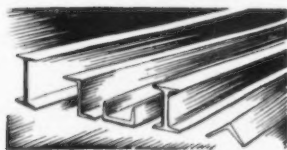
ST. LOUIS, Jan. 29.—An East Side melter has bought several thousand tons of No. 2 heavy melting steel. This represents the first sizable purchase of the year, and was made on the basis of present quotations. The market advance generally has been checked, due to declines in Chicago and the Ohio Valley markets. However, there is said to be little or no distress scrap in the market, and dealers expect better prices within the next few weeks.

Specifications against contracts for shipments of pig iron continue heavy, although not much new business is being placed. Reports from the implement manufacturing districts of Illinois are that operations are heavier than at any time since 1928. This activity is being reflected in greatly improved business among jobbing foundries. The stove trade is in a lull at present, pending the making up of new models.

A strike of 500 enamel workers in the stove plants at Belleville lasted two days, the men returning to work after submitting their demands to arbitration. Arbitrators denied the demand for a flat 10 per cent wage increase, but increased the minimum of 45c. to 47½c. an hour to 52½c. an hour. Skilled workers will continue to receive 52½c. to 65c. an hour, but apprentices and semi-skilled workers will profit by the increase of the minimum.

Business in finished iron and steel is holding up fairly well, although buying is still confined to current needs. Cold weather has adversely affected the movement of wire products and roofing material.

Mills Fill Up on Cold-Rolled Sheets in Cleveland Area



Otis Steel Co. Adds Second Blast Furnace—Steel Bookings Largest for Any Month Since Last June

CLEVELAND, Jan. 29.—Demand for sheets and strip steel from the automotive industry is being maintained at the recent heavy volume and, with steel ordered to cover their February production schedules, some business has been booked for March shipment, which is the best delivery several mills can promise on full-finished sheets. Some producers have little tonnage of cold-rolled sheets available for the remainder of the quarter. Other products for which demand has been stimulated by the heavy production schedules of the automobile manufacturers include billets, wire rods, cold-finished bars and manufacturers' wire.

Ingot output in the Cleveland-Lorain territory is unchanged this week at 67 per cent of capacity. The Otis Steel Co. has started the second blast furnace to supply the increased requirements of its steel plant.

Orders for sheets from makers of refrigerators, washing machines and other household equipment are still being placed in good volume. Miscellaneous demand continues to broaden. There is a gain in tonnage from metal-working plants using the heavier rolled steel products which are getting busier. In wire products some activity has developed in fence.

Including all steel products, probably more tonnage was booked in this market the past week than during any previous week since demand started upward. Business booked by some mills in January will be double the tonnage entered in December and will be larger than in any month since last June. This gain has been made in spite of lack of business from railroads and little activity in the construction field.

Pig Iron

The melt by miscellaneous foundries is on the upward trend, and demand for pig iron from these consumers has improved although most current business is coming from automotive foundries. One merchant furnace interest will

ship 50 per cent more iron during January than in December and during the week sold 8000 tons in lots up to 1000 tons largely to automobile foundries, although less tonnage is being booked this month than in December because many foundries covered last month for most of their first quarter requirements. Some Buffalo foundry iron is finding a market in Cleveland and a fair demand has developed for Southern foundry grades.

Bars, Plates and Shapes

Bars, both alloy and plain carbon, continue in heavy demand from forge shops and other plants doing automotive work. Miscellaneous business in all these products is broadening. A fair demand for bars has sprung up for oil company products. Agricultural implement makers are ordering freely, but road machinery manufacturers are not showing much activity. Miscellaneous plate orders have improved, particularly from makers of pressure vessels for the oil industry. A pipe line for the Diamond Alkali Co. at Fairport, Ohio, will require 390 tons of plates. There has been a gain in orders for structural shapes from crane builders and other consumers outside the building field.

Strip Steel

Hot-rolled strip still is in heavy demand from cold-rolling plants and some mills are two weeks behind on deliveries. Specifications for cold-rolled strip from the automotive industry continue heavy and deliveries have become slow on the wider material.

Sheets

Orders for large tonnages continue to come from the automotive industry, which is now purchasing sheets for March shipment. Deliveries have become further extended and a number of mills have little tonnage to offer in cold-rolled sheets for delivery during the remainder of the quarter. Hot-rolled sheets are available for shipment

in two weeks. Miscellaneous demand has become heavier. Good orders for galvanized sheets are coming from manufacturers of roofing, eaves trough and other building material. Enameling sheets continue very active.

Reinforcing Bars

Bids for 2400 tons of reinforcing bars will be taken by the United States Engineers, Zanesville, Ohio, Feb. 5, for six dams in the Muskingum Conservancy District. This steel will be required for the Mohawk dam in addition to 1100 tons needed for five smaller dams for which bids recently were rejected.

Bolts, Nuts and Rivets

Demand for bolts and nuts from the automotive industry is heavy and this business is keeping sales up close to the December volume, although many buyers, particularly jobbers, placed specifications last month before the price advance. Shipments are far better than in December. A good demand has developed from the agricultural implement industry and orders from miscellaneous consumers show a gain. Small rivets are moving well to motor car manufacturers. Large rivets remain rather quiet.

Scrap

A Youngstown district mill during the week placed a fair tonnage of heavy melting steel, paying \$13.25 for the No. 1 grade. The local market is quiet following a recent purchase by a Cleveland mill. Most consumers are believed to have covered for about all the scrap they will need in February and are not expected to make new purchases for a few weeks. The Chevrolet Motor Co. has issued a 5000-ton scrap list composed of various grades, and the New York Central Railroad will take bids Feb. 5 on an unstated tonnage. Prices are unchanged and steady, and dealers are having no trouble in covering at ruling quotations against outstanding orders.

Detroit Scrap Prices Unchanged

DETROIT, Jan. 29.—The local market is leaning toward the soft side on account of current production of more scrap than steel plants in this district can absorb. Steel mills in other districts are well supplied with scrap, so that little improvement in the situation is expected in the next few weeks. Although showing a weak tendency, prices have not changed.

Eastern Pennsylvania Rate Up One Point to 36 Per Cent



Autobody Stamping Plants Are Operating at Peak Level—Scrap Quiet; 50,000 Tons Sold to Italy

PHILADELPHIA, Jan. 29. — Fresh business continues to appear in steadily increasing volume, although the betterment cannot be attributed to any particular outlet. Despite the improvement in bookings, however, the aggregate demand from consumers in this district is still far behind most other sections of the country. Significance is being attached to current business because it appears to have more reality than previous bulges in demand. Most orders specify delivery as quickly as possible, indicating that users need supplies but are not stocking material.

Slightly better melting schedules in several district mills have raised the eastern Pennsylvania operating rate one point to 36 per cent of capacity. Central Iron & Steel Co. is operating two furnaces; Pencoyd has three furnaces on and is rolling on two structural mills; Sparrows Point, Md., is running almost at 100 per cent, and Steelton will probably continue melting in three furnaces until the second quarter.

Oil refineries in this territory are operating at a higher rate and are buying more steel for repairs and maintenance. Wire products are in heavy demand, and the few tin plate users here are taking fair quantities of material.

Luria Brothers & Co., Inc., has sold 50,000 tons of No. 2 steel scrap for delivery in Italy. Total shipments by all American sellers to Italy amounted to 19,363 tons in December, and 204,523 tons in 1934. Shipments in 1933 totaled 120,469 tons.

Pig Iron

The volume of new sales has fallen off slightly. The leading producer has booked several lots of about 500 tons each, but most current sales involve only 50 to 100 tons for nearby shipment. A few foundries have ordered iron to build up their stocks. Most jobbing plants, however, are satisfied to order piecemeal to cover the needs of the immediate future. At

present there are no indications of price changes for the second quarter.

Sheets

Blue annealed stock continues to move at a moderate pace, but automobile sheets are quite active. Although Budd and Heintz are the only large users of full-finished material in this territory, they are having difficulty securing satisfactory deliveries. The one major producer here can ship in four weeks, but some Western mills are scheduled through the first quarter on certain grades. Local autobody stamping plants are operating at the highest rate in many months, and this activity is expected to continue into the second quarter. The Budd plant is turning out 1000 Ford cabs, 300 Studebaker bodies, 600 Dodge units and 100 Airflow bodies each day. The Heintz plant is operating comparatively as well. These schedules will probably be stepped up slightly in the near future as automobile production reaches a peak.

Imports

The following iron and steel imports were received here last week: 4000 tons of chrome ore from Portuguese Africa and 1 ton of ferrotitanium from England.

Bars, Plates and Shapes

All three of these products are currently moving very slowly. There were no bar awards of importance during the week, and active tonnages include only 680 tons for buildings at the Philadelphia Navy Yard and 160 tons for a Radnor Township sewage disposal plant. Likewise there were no sizable structural steel awards during the week. Pending projects are very light, inasmuch as highway construction is almost at a standstill. Plates are moving into miscellaneous consumption in slightly better volume, but the absence of railroad purchasing is keeping the total tonnage down to a low level. The Central Iron & Steel Co. will furnish 100 tons of plates to the

Baltimore & Ohio Railroad for car construction. Pending plate tonnages include tanks for Continental Distillery Co. and Socony-Vacuum Oil Co., which will require 100 tons each.

Scrap

The heavy snowfall and low temperatures prevalent in this area have reduced scrap shipments to about one-third the volume of a fortnight ago. Consequently the market is quiet, but surprisingly enough there is a slight tendency toward weakness. Neither Pencoyd nor Eddystone has shown any intention of purchasing fresh supplies, and other district mills and foundries are restricting commitments to cover immediate needs. No broker believes \$12 can be bettered in eastern Pennsylvania at the present time, and a few sellers are of the opinion that \$11.75 would represent the best offer obtainable. The most significant sale of the week was 50,000 tons of No. 2 steel sold for Italian delivery over the next four months. In addition, Japan has come into the market for additional commitments totaling about 20,000 tons. This increased willingness to sell ahead on foreign deliveries is judged by some observers as an indication that well-informed brokers consider the present scrap market to be at a peak level. A boat cleared Port Richmond today carrying 7500 tons of rails, No. 1 and No. 2 steel, to Japan. The next boat is due on Feb. 4, also to load steel for Japan. At Baltimore and Washington, Bethlehem is securing some No. 1 and No. 2 for \$11 and \$10 respectively for Sparrows Point, Md., delivery.

Construction Steel in Demand on Coast

SAN FRANCISCO, Jan. 28. — Bids for furnishing 7030 tons of billet and rail reinforcing steel for the Colorado River aqueduct will be opened Feb. 11 by the Metropolitan Water District at Los Angeles. Awards under the first reinforcing bar contract let this year have been announced by the district as follows: 2075 tons to Truscon Steel Co., 2075 tons to Security Materials Co. and 1680 tons to Soule Steel Co.

Approximately 9342 tons of reinforcing bars and 6813 tons of structural steel are involved in projects on which bids have been opened and awards are expected shortly. At San Francisco the Trans-Bay bridge viaduct will require 3335 tons of reinforcing bars.

Specifications for 3580 tons of bars are included in the contract for enlarging and lining the Moffatt tunnel west of Denver, Colo. The award of 2851 tons of steel sheet piling for a bulkhead at Government Island, Cal., is being withheld pending further appropriations by Congress. The letting of 26,000 tons of rails for the Southern Pacific Co. has not yet been announced.

Herrick Iron Works booked 185 tons of structural steel for the Jurgen office building in Oakland, Cal. Two awards, aggregating 351 tons of cast iron pipe, went to United States Pipe & Foundry Co. No major reinforcing bookings other than the Metropolitan Water District awards were reported during the week.

The continued activity of Japanese buyers in the Pacific Coast scrap market has had a steady effect, and there are some indications of a rise in scrap prices before the end of the quarter.

No changes in mill prices are looked for, although it is reported that mill operations are not far from capacity.

Mills Near Capacity In Cincinnati Area

CINCINNATI, Jan. 29.—Steady ordering of sheet steel has brought the demand indexes of district mills to close to 95 per cent of capacity. Leading the activity in the current market, the automobile makers are taking more than their normal proportion of output, while other users are rapidly approaching their normal volume of demand. In some products, particularly cold-rolled sheets, mill output is rapidly approaching 100 per cent, and schedules are being steadily increased to insure delivery this quarter. As a result of the continuous demand, district mills report that small backlogs are accumulating weekly. Rolling schedules for this week have been set at mill capacity, so that shipping instructions may be completely fulfilled. Prices for second quarter are engaging attention of mill operators, although there are as yet no indications as to possible changes.

After a week of uncertainty over the gold clause cases, the district pig iron market has settled back to its normal routine. Fresh bookings for spot shipment totaled about 450 tons. Shipments generally are up 25 per cent over December. Inquiry, however, is light, current sales being the result of direct solicitation.

Activity among domestic coke

dealers to obtain advance orders before effective dates of the new sales tax in Ohio stimulated domestic ordering far beyond seasonal trends the past week. Foundry grades are reflecting the moderate improvement in automotive foundry operations, but heavy contracting has not materialized.

Failure of substantial mill ordering to develop has softened the general undertone of the local scrap market. Dealers' bids, however, are unchanged, though considered nominal.

Pig Iron Bookings Gain in South

BIRMINGHAM, Jan. 29.—There has been a moderate improvement in pig iron contracting during the past several weeks, and more foundries are now placing their prospective requirements for the first quarter. However, a sizable number are still buying on a spot basis or close to current melt. Bookings this month have run ahead of both November and December. On the other hand, shipments have lagged somewhat, and the month's movement is not as good as was expected.

Four furnaces now are operating, as compared with seven earlier in the month. However, three were being operated only temporarily for rebanking. All three were Tennessee Coal, Iron & Railroad Co. stacks. On Jan. 11, Ensley No. 6 was rebanked after a week's operation; on Jan. 15 Fairfield No. 6 was rebanked after about two months' operation, while on Jan. 16 Ensley No. 5 was rebanked after less than a month of production.

Current bookings of wire products and galvanized sheets have been rather steady for the past week or so. Present demand is attributed largely to replenishing of stocks that were allowed to dwindle as the end of the year approached. Sales of heavy products continue sporadic.

Some additional rail tonnage has been booked, but the total amount is not yet sufficient for the resumption of the Ensley rail mill. It is thought that the mill will get back into production toward the latter part of February.

Six open-hearths were operated most of last week, with a seventh added on Friday. The schedule this week calls for seven.

Cast pipe plants operated but little last week on account of cold weather. January awards compare favorably with those of the past several months, but shipments

show a decrease. The current quotation for class B pipe, 6 in. and over, is \$38 for 200 tons and over; \$39 for under 200 tons.

There has been a stronger trend to the scrap market. Sales have improved and inquiries are more numerous. Several revisions upward have been made in prices.

Steady Improvement in Canadian Business

TORONTO, ONT., Jan. 29.—Steady improvement in business is reported by the Canadian iron and steel industry. While there have been no contracts placed for rails and rolling stock, business of this nature is said to be pending and it is expected that awards will be made in the not distant future. Orders from other sources, automotive, manufacturers of electric stoves, refrigerators, etc., are increasing. Building trades continue quiet, with no improvement in sight for the immediate future. Demand for steel and equipment from the mining industry is holding at a good level, although some large purchases are in abeyance pending new financing arrangements for the companies concerned. Operations in the various plants of the Dominion are holding slightly above the average for last year, with prospects that there will be improvement before spring.

Dealing with pig iron and primary steel production for 1934, the Dominion Bureau of Statistics, Ottawa, states that in the former the gain over the previous year was 79 per cent and in the latter 85 per cent, showing total output of 406,995 gross tons and 759,070 gross tons respectively.

Demand for merchant pig iron is holding at a steady level and while no forward delivery contracts have been placed, spot sales are sustained. Sales for the past fortnight averaged around 550 tons weekly, made up of single car-lots with occasional orders for 100 tons. The daily melt is said to be between 35 and 40 per cent of capacity. Three furnaces are blowing and one is banked out of 11 in Canada, with production in excess of 1200 tons per day. Prices are unchanged.

Trading in iron and steel scrap is showing slow but steady improvement. Steel mills in the Hamilton district are taking delivery of heavy melting steel, and dealers expect that soon there will be a movement of turnings in that direction. It is stated that the Burlington Steel Co., Burlington, Ont., is installing an electric furnace to handle scrap.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars	
Soft Steel	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.09c.
Del'd New York	2.13c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel	
(For merchant trade)	
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing	
(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing	
(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron	
F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*	
Base per Lb.	
F.o.b. Pittsburgh	2.10c.
F.o.b. Chicago	2.15c.
F.o.b. Gary	2.15c.
F.o.b. Cleveland	2.15c.
F.o.b. Buffalo	2.20c.
Del'd Detroit	2.20c.
Del'd eastern Michigan	2.35c.

* In quantities of 10,000 to 10,000 lb.

Fence and Sign Posts	
Angle Line Posts	
Base per Net Ton	
F.o.b. Pittsburgh	\$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	65.00

Plates	
Base per Lb.	
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.95c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.95c.
Del'd New York	2.05c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh.	3.00c.

Floor Plates	
F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes	
Base per Lb.	
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.95c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.05c.
Del'd New York	2.05c.
F.o.b. Birmingham (standard)	1.85c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

Base per Lb.	
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE

TERNE PLATE	
Sheets	
Hot Rolled	
Base per Lb.	
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.11c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.
Hot-Rolled Annealed	
No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled	
No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

Light Cold-Rolled	
No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c.

Galvanized Sheets	
No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. dock cars Pacific ports	3.25c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes	
No. 24, unassorted 8-lb. coating	3.40c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enamel Stock	
No. 20, f.o.b. Pittsburgh	3.10c.

Tin Mill Black Plate	
No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast ports	3.35c.

Tin Plate	
Per Base Box	
Standard cokes, f.o.b. P'gh district mill	\$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate	
(F.o.b. Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.	
Base per Lb.	
All widths up to 24 in., P'gh.	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

Cold-Rolled Strips	
Base per Lb.	
F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.88c.
F.o.b. Worcester	2.80c.

Fender Stock	
No. 14, Pittsburgh or Cleveland	2.90c.
No. 15, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips	
Base per Lb.	
F.o.b. Pittsburgh	1.75c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade	Per Lb.
Bright wire	2.30c.
Spring wire	2.90c.
Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are \$2 a ton above, Birmingham \$3 above, and Pacific Coast prices \$9 a ton above Pittsburgh or Cleveland.	

To Jobbing Trade	
Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.	

Base per Keg	
Standard wire nails	\$2.60
Smooth coated nails	2.60
Galvanized nails:	
15 gage and coarser	4.60
16 gage and finer	5.10

Base per 100 Lb.	
Annealed fence wire	\$2.45
Galvanized fence wire	2.80
Polished staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are \$2 a ton over Pittsburgh (except for woven wire fence at Duluth which is \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are \$6 a ton over Pittsburgh, while Pacific Coast prices are \$8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are \$11 a ton above Pittsburgh. On staples and barbed wire, prices of \$6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

Off List	
F.o.b. Pittsburgh	35 and 2 1/2 off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe	
Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills	
F.o.b. Pittsburgh only on wrought iron pipe.	

Butt Weld	
Steel	Wrought Iron
Inches	Inches
Black Galv.	Black Galv.
1/4 to 3/4	1/4 to 3/4
1/2 to 3/4	1/2 to 3/4
3/4 to 1	3/4 to 1
1 to 1 1/2	1 to 1 1/2
1 1/2 to 2	1 1/2 to 2
2 to 3	2 to 3
3 to 4	3 to 4
4 to 6	4 to 6
6 to 8	6 to 8
8 to 10	8 to 10
10 to 12	10 to 12
12 to 14	12 to 14
14 to 16	14 to 16
16 to 18	16 to 18
18 to 20	18 to 20
20 to 24	20 to 24
24 to 30	24 to 30
30 to 36	30 to 36
36 to 42	36 to 42
42 to 48	42 to 48
48 to 54	48 to 54
54 to 60	54 to 60
60 to 66	60 to 66
66 to 72	66 to 72
72 to 78	72 to 78
78 to 84	78 to 84
84 to 90	84 to 90
90 to 96	90 to 96
96 to 102	96 to 102
102 to 108	102 to 108
108 to 114	108 to 114
114 to 120	114 to 120
120 to 126	120 to 126
126 to 132	126 to 132
132 to 138	132 to 138
138 to 144	138 to 144
144 to 150	144 to 150
150 to 156	150 to 156
156 to 162	156 to 162
162 to 168	162 to 168
168 to 174	168 to 174
174 to 180	174 to 180
180 to 186	180 to 186
186 to 192	186 to 192
192 to 198	192 to 198
198 to 204	198 to 204
204 to 210	204 to 210
210 to 216	210 to 216
216 to 222	216 to 222
222 to 228	222 to 228
228 to 234	228 to 234
234 to 240	234 to 240
240 to 246	240 to 246
246 to 252	246 to 252
252 to 258	252 to 258
258 to 264	258 to 264
264 to 270	264 to 270
270 to 276	270 to 276
276 to 282	276 to 282
282 to 288	282 to 288
288 to 294	288 to 294
294 to 300	294 to 300
300 to 306	300 to 306
306 to 312	306 to 312
312 to 318	312 to 318
318 to 324	318 to 324
324 to 330	324 to 330
330 to 336	330 to 336
336 to 342	336 to 342
342 to 348	342 to 348
348 to 354	348 to 354
354 to 360	354 to 360
360 to 366	360 to 366
366 to 372	366 to 372
372 to 378	372 to 378
378 to 384	378 to 384
384 to 390	384 to 390
390 to 396	390 to 396
396 to 402	396 to 402
402 to 408	402 to 408
408 to 414	408 to 414
414 to 420	414 to 420
420 to 426	420 to 426
426 to 432	426 to 432
432 to 438	432 to 438
438 to 444	438 to 444
444 to 450	444 to 450
450 to 456	450 to 456
456 to 462	456 to 462
462 to 468	462 to 468
468 to 474	468 to 474
474 to 480	474 to 480
480 to 486	480 to 486
486 to 492	486 to 492
492 to 498	492 to 498
498 to 504	498 to 504
504 to 510	504 to 510
510 to 516	510 to 516
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522 to 528	522 to 528
528 to 534	528 to 534
534 to 540	534 to 540
540 to 546	540 to 546
546 to 552	546 to 552
552 to 558	552 to 558
558 to 564	558 to 564
564 to 570	564 to 570
570 to 576	570 to 576
576 to 582	576 to 582
582 to 588	582 to 588
588 to 594	588 to 594
594 to 600	594 to 600
600 to 606	600 to 606
606 to 612	606 to 612
612 to 618	612 to 618
618 to 624	618 to 624
624 to 630	624 to 630
630 to 636	630 to 636
636 to 642	636 to 642
642 to 648	642 to 648
648 to 654	648 to 654
654 to 660	654 to 660
660 to 666	660 to 666
666 to 672	666 to 672
672 to 678	672 to 678
678 to 684	678 to 684
684 to 690	684 to 690
690 to 696	690 to 696
696 to 702	696 to 702
702 to 708	702 to 708
708 to 714	708 to 714
714 to 720	714 to 720
720 to 726	720 to 726
726 to 732	726 to 732
732 to 738	732 to

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List	
Machine bolts	70, 10 and 10
Carriage bolts	70, 10 and 10
Lag bolts	70, 10 and 10
Flange bolts, Nos. 1, 2, 3 and 7	70, 10 and 10
Hexagonal nuts	70, 10 and 10
Hot-pressed nuts, blank or tapped	70, 10 and 10
Square nuts	70, 10 and 10
Hot-pressed nuts, blank or tapped	70, 10 and 10
Hexagonal nuts	70, 10 and 10
C.P.C. and t. square or hex. nuts	70, 10 and 10
Blank or tapped	70, 10 and 10
Semi-finished hexagon nuts, U.S.S.	70, 10 and 10
all sizes	70, 10 and 10
Semi-finished hexagon nuts, S.A.E.	70, 10 and 10
1/4 in. to 7/16 in. diameter	75, 10 and 10
1/2 in. to 1 in. diameter	75, 10 and 10
larger than 1 in. diameter	75, 10 and 10
Steel bolts in packages, Pittsburgh	75
Steel bolts in packages, Chicago	75
Steel bolts in packages, Cleveland	75
Steel bolts in bulk, Pgh.	83
Steel bolts in bulk, Chicago	83
Steel bolts in bulk, Cleveland	83
Tire bolts	60 and 10

Large Rivets

(1/2-in. and larger)

Base per 100 Lb.	
F.o.b. Pittsburgh or Cleveland	\$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

Per Cent Off List	
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List	
Milled cap screws, 1 in. dia. and smaller	80, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread	75
1/2 in. and smaller	75
Split hex. head cap screws, U.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws, cut and oval point	75 and 10 to 80
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Hamilton, Buffalo, Bethlehem	Un-cracked	\$40 per gross ton
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Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Hamilton, Buffalo, Bethlehem	Base price, \$49 a gross ton
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Alloy Steel Bars

Price del'd Detroit is \$52.	
F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.	
Open-hearth grade, base	2.45c.

Alloy

Differential	
Series	per 100 lb.

Numbers	
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2000 (1/4% Nickel)	\$0.25
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1100 (2 1/4% Nickel)	0.55
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2000 (3 1/4% Nickel)	1.50
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2000 (5% Nickel)	2.25
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2100 Nickel Chromium	0.55
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2200 Nickel Chromium	1.35
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2300 Nickel Chromium	3.80
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2400 Nickel Chromium	3.20
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4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
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4200 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
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4300 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
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5100 Chromium Steel (0.60 to 0.80 Chromium)	0.35
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5200 Chromium Steel (0.80 to 1.10 Chromium)	0.45
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5300 Chromium Spring Steel	base
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6100 Chromium Vanadium Bar	1.20
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6200 Chromium Vanadium Spring Steel	0.70
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Chromium Nickel Vanadium	1.50
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Carbon Vanadium	0.95
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These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is 1/4c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo	2.95c. base per lb.
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STAINLESS STEEL No. 302

(17 to 19% Cr., 7 to 9% Ni, 0.08 to 0.20% C)

(Base Prices, f.o.b. Pittsburgh)

Per Lb.	
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Forging billets	19.55c.
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Rolling slabs	15c.
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Bars	23c.
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Plates	26c.
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Structural shapes	23c.
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Ribbed	33c.
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Hot-rolled strip	20 1/2c.
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Cold-rolled strip	27c.
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Drawn wire	23c.
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Raw and Semi-Finished Steel

Carbon Steel Re-rolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	Un-cracked	\$29 per gross ton
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Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	Un-cracked	\$31 per gross ton
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Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham		
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Per Gross Ton

Re-rolling	\$27.00
Forging quality	\$2.00

Delivered Detroit

Re-rolling	\$30.00
Forging	\$5.00

Billets Only F.o.b. Duluth

Re-rolling	\$29.00
Forging	\$4.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.		
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Per Gross Ton

Open-hearth or Bessemer	\$28.00
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Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.		
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Per Lb.

Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

Base per Lb.	
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F.o.b. Pittsburgh	1.80c.
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F.o.b. Chicago	1.85c.
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F.o.b. Cleveland	1.85c.
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F.o.b. Buffalo	1.90c.
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F.o.b. Birmingham	1.95c.
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Wire Rods

(Common, base)

Per Gross Ton	
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F.o.b. Pittsburgh	\$38.00
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F.o.b. Cleveland	38.00
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F.o.b. Chicago	39.00
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F.o.b. Anderson, Ind.	39.00
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F.o.b. Youngstown	39.00
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F.o.b. Worcester, Mass.	41.00
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F.o.b. San Francisco	47.00
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F.o.b. Galveston	44.00
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CANADA

Pig Iron

Per gross ton:

Delivered Toronto	
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No. 1 fdy., sil. 2.25 to 2.75	\$21.00
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No. 2 fdy., sil. 1.75 to 2.75	20.50
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Malleable	21.00
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Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	\$22.50
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No. 2 fdy., sil. 1.75 to 2.25	22.00
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Malleable	22.50
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Basic	22.00
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FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton	
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Domestic, 80% (carload)	\$35.00
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Spiegeleisen

Per Gross Ton Furnace	
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Domestic, 19 to 21%	\$28.00
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Electric Ferrosilicon

Per Gross Ton Delivered	
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50% (carloads)	\$77.50
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50% (ton lots)	85.00
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75% (carloads)	126.00
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75% (ton lots)	136.00
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14% to 16% (f.o.b.) Welland, Ont.	31.00
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14% to 16% (less carloads)	38.50
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Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton	
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6%	\$22.75
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7%	23.75
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8%	24.75
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9%	25.75
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10%	26.75
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11%	27.75
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12%	28.75
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13%	29.75
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14%	30.75
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15%	31.75
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16%	32.75
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17%	33.75
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18%	34.75
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19%	35.75
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20%	36.75
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21%	37.75
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22%	38.75
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23%	39.75
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24%	40.75
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25%	41.75
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26%	42.75
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27%	43.75
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28%	44.75
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29%	45.75
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30%	46.75
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31%	47.75
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32%	48.75
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33%	49.75
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34%	50.75
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35%	51.75
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36%	52.75
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37%	53.75
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38%	54.75
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39%	55.75
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40%	56.75
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41%	57.75
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42%	58.75
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43%	59.75
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44%	60.75
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45%	61.75
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46%	62.75
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47%	63.75
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48%	64.75
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49%	65.75
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50%	66.75
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51%	67.75
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52%	68.75
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53%	69.75
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54%	70.75
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55%	71.75
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56%	72.75
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57%	73.75
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58%	74.75
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59%	75.75
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Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$13.00 to \$13.50
No. 2 heavy melting steel	12.00 to 12.50
No. 2 railroad wrought	12.00 to 12.50
Scrap rails	14.00 to 14.50
Itals 3 ft. and under	14.50 to 15.00
Compressed sheet steel	12.75 to 13.25
Hand bundled sheet steel	12.00 to 12.50
Hvy. steel axle turnings	10.50 to 11.00
Machine shop turnings	9.00 to 9.50
Short shov. turnings	9.00 to 9.50
Short mixed borings and	
turnings	6.75 to 7.25
Cast iron borings	6.75 to 7.25
Cast iron carwheels	12.75 to 13.25
Heavy breakable cast	12.25 to 12.75
No. 1 cast	13.50 to 14.00
Rail. knuckles and cou-	
plers	15.00 to 15.50
Rail, coil and leaf springs	15.00 to 15.50
Rolled steel wheels	15.00 to 15.50
Low phos. billet crops	15.00 to 15.50
Low phos. sheet bar crops	15.00 to 15.50
Low phos. plate scrap	14.00 to 14.50
Low phos. punchings	14.00 to 14.50
Steel car axles	15.00 to 15.50

CHICAGO

Delivered Chicago district consumers:	
	Per Gross Ton
Heavy melting steel	\$11.25 to \$11.75
Automobile hvy. melt, steel	11.00 to 11.50
Shoveling steel	11.25 to 11.75
Hydraulic comp. sheets	10.50 to 11.00
Drop forge flashings	9.75 to 10.25
No. 1 busheling	10.50 to 11.00
Rolled carwheels	12.50 to 13.00
Railroad ties	13.00 to 13.50
Railroad leaf springs	12.50 to 13.00
Axle turnings	10.50 to 11.00
Steel couplers and knuckles	12.50 to 13.00
Coil springs	13.00 to 13.50
Axle turnings (elec. fur.)	12.50 to 13.00
Low phos. punchings	13.00 to 13.50
Low phos. plates, 12 in.	
and under	14.00 to 14.50
Cast iron borings	7.00 to 7.50
Short shoveling turnings	7.00 to 7.50
Machine shop turnings	6.00 to 6.50
Rerolling rails	12.50 to 13.00
Steel rails, less than 3 ft.	13.25 to 13.75
Steel rails, less than 2 ft.	13.50 to 14.00
Angle bars, steel	13.00 to 13.50
Cast iron carwheels	12.00 to 12.50
Railroad malleable	13.50 to 14.00
Agricultural malleable	10.00 to 10.50

PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$11.50 to \$12.00
No. 2 heavy melting steel	10.00 to 10.50
No. 1 railroad wrought	11.00 to 11.50
Bundled sheets	9.00
Hydraulic compressed, new	10.00 to 10.50
Hydraulic compressed, old	8.50 to 9.00
Machine shop turnings	8.50 to 9.00
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Heavy breakable cast	10.50 to 11.00
Store plate (steel works)	8.50 to 9.00
No. 1 low phos. heavy	15.00 to 15.50
Couplers and knuckles	14.00 to 14.50
Rolled steel wheels	14.00 to 14.50
No. 1 blast furnace	5.00 to 5.50
Spec. iron and steel pipe	8.00
Shafting	17.00 to 17.50
Steel axles	16.50 to 17.00
No. 1 forge fire	9.00
Cast iron car wheels	11.50 to 12.00
No. 1 cast	11.00 to 11.50
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00

CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$9.00 to \$9.50
Scrap rails for melting	9.00 to 9.50
Loose sheet clippings	5.50 to 6.00
Bundled sheets	7.00 to 7.50
Cast iron borings	5.50 to 6.00
Machine shop turnings	5.50 to 6.00
No. 1 busheling	7.00 to 7.50
No. 2 busheling	3.75 to 4.25
Rails for rolling	10.00 to 10.50
No. 1 locomotive tires	8.25 to 8.75
Short rails	12.50 to 13.00
Cast iron carwheels	9.00 to 9.50
No. 1 machinery cast	10.25 to 10.75
No. 1 railroad cast	9.50 to 10.00
Burnt cast	7.00 to 7.50
Store plate	7.00 to 7.50
Agricultural malleable	9.00 to 9.50
Railroad malleable	10.00 to 10.50

CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$11.00 to \$11.50
No. 2 heavy melting steel	10.50 to 11.00
Compressed sheet steel	10.50 to 11.00
Light bundled sheet stamp-	
ings	8.50 to 9.00
Drop forge flashings	9.50 to 10.00
Machine shop turnings	7.00 to 7.50
Short shoveling turnings	8.00 to 8.50
No. 1 busheling	9.50 to 10.00
Steel axle turnings	9.50 to 10.00
Low phos. billet crops	14.50 to 15.00
Cast iron borings	8.00 to 8.50
Mixed borings and short	
turnings	8.00 to 8.50
No. 2 busheling	12.50 to 13.00
No. 1 cast	7.00 to 7.50
Railroad grate bars	8.00 to 8.50
Store plate	8.00 to 8.50
Rails under 3 ft.	15.00 to 15.50
Rails for rolling	15.50 to 16.00
Railroad malleable	12.00 to 12.50
Cast iron carwheels	12.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$12.00 to \$12.50
No. 2 heavy melting scrap	10.50 to 11.50
Scrap rails	12.00 to 12.50
New hydraul. comp. sheets	10.50 to 11.50
Old hydraul. comp. sheets	9.50 to 10.00
Drop forge flashings	10.50 to 11.50
No. 1 busheling	10.50 to 11.50
Hvy. steel axle turnings	8.00 to 8.50
Machine shop turnings	6.25 to 6.75
Knuckles and couplers	13.50 to 14.00
Coil and leaf springs	13.50 to 14.00
Rolled steel wheels	13.50 to 14.00
Low phos. billet crops	13.75 to 14.25
Short shov. steel turnings	6.75 to 7.25
Short mixed borings and	
turnings	6.75 to 7.25
Cast iron borings	6.75 to 7.25
No. 2 busheling	7.50 to 8.00
Steel car axles	13.50 to 14.00
Iron axles	13.50 to 14.00
No. 1 machinery cast	12.00 to 12.50
No. 1 cupola cast	10.50 to 11.00
Store plate	10.00 to 10.50
Steel rails, 3 ft. and under	14.00 to 14.50
Cast iron carwheels	11.50 to 12.00
Industrial malleable	12.50 to 13.00
Railroad malleable	12.50 to 13.00
Chemical borings	8.50 to 9.00

BOSTON

Dealers' buying prices per gross ton:	
*No. 1 heavy melting steel	\$9.00 to \$9.25
No. 1 heavy melting steel	7.50 to 7.75
Scrap rails	7.75 to 8.00
*No. 2 steel	6.50 to 6.75
No. 2 steel	6.50 to 7.00
Breakable cast	6.50 to 6.75
Machine shop turnings	3.00 to 3.25
Bundled skeleton, long	6.00 to 6.20
Forge flashings	6.00 to 6.20
Shafting	11.50 to 12.00
Steel car axles	11.50 to 12.00
Cast iron borings, chemical	6.50 to 7.00
Store plate	4.00 to 4.25
Per gross ton delivered consumers' yards:	
Textile cast	\$9.00 to \$9.50
No. 1 machinery cast	9.00 to 9.50
Store plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$8.00 to \$8.00
No. 2 heavy melting steel	6.50 to 7.25
Heavy breakable cast	6.75 to 7.25
No. 1 machinery cast	7.50 to 8.00
No. 2 cast	6.50 to 7.00
Store plate	6.00 to 6.25
Steel car axles	12.50 to 13.00
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Forge fire	5.50 to 6.00
Rails for rolling	9.00 to 9.50
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	3.50 to 4.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and	
steel	4.50 to 5.00

Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$10.50
No. 1 hvy. cast (cupola size)	9.50
No. 2 cast	8.00

*For direct car loading only.
†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$9.00 to \$9.50
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Store plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	7.00
Rails for rolling	12.50
No. 1 cast	9.50 to 10.00
Tramcar wheels	10.00
Cast iron borings, chem.	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$9.25 to \$9.75
No. 1 heavy melting	8.50 to 9.00
No. 2 heavy melting	7.50 to 8.00
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	10.00 to 10.50
Railroad springs	11.00 to 11.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	9.25 to 9.75
No. 1 busheling	5.00 to 5.50
Cast iron borings and	
shoveling turnings	4.00 to 4.50
Rails for rolling	11.00 to 11.50
Machine shop turnings	4.00 to 4.50
Heavy turnings	5.50 to 6.00
Steel car axles	13.50 to 14.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	7.50 to 8.00
Steel rails less than 3 ft.	11.75 to 12.25
Steel angle bars	9.50 to 10.00
Cast iron carwheels	8.25 to 9.25
No. 1 machinery cast	9.00 to 9.50
Railroad malleable	10.00 to 10.50
No. 1 railroad cast	9.00 to 9.50
Store plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$9.00 to \$9.50
Borings and short turnings	5.50 to 6.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.50% iron	\$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.&I. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	9.50c.
Iron, low phos., Swedish, average 68% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52% Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48%	20c.

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered	\$17.50 to \$18.50
Tungsten, domestic scheelite, delivered	17.00

Per Gross Ton

Chrome, 45%, Cr ₂ O ₃ , crude, c.i.f. Atlantic Seaboard	\$17.00
Chrome, 48%, Cr ₂ O ₃ , c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.
†Nominal; no supplies available.

Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	\$15.50 to \$16.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	17.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	\$15.50 to 16.00
Foreign, 85% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

Per Net Ton	
Furnace, f.o.b. Connellville Prompt	\$3.85
Foundry, f.o.b. Connellville Prompt	\$4.60 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.90

Long turnings	\$5.00 to \$5.50
No. 1 machinery cast	10.50 to 11.00
Automotive cast	10.75 to 11.25
Hydraul. comp. sheets	9.50 to 10.00
Store plate	6.50 to 7.00
New factory busheling	7.75 to 8.25
Old No. 2 busheling	5.00 to 5.50
Sheet clippings	6.00 to 6.50
Flashings	8.50 to 9.00
Low phos. plate scrap	9.75 to 10.25

CANADA

Dealers' buying prices per gross ton:

Toronto Montreal	
Heavy melting steel	\$7.00 \$7.50
Rails scrap	8.00 8.50
Machine shop turnings	3.00 3.50
Boiler plate	4.50 4.75
Heavy axle turnings	4.50 4.75
Cast borings	4.00 4.25
Steel borings	2.00 2.25
Steel axles	3.50 3.75
Wrought pipe	7.00 7.25
Steel axles	7.00 7.25
Axles, wrought iron	7.00 7.25
No. 1 machinery cast	9.00 9.25
Store plate	5.50 5.75
Standard carwheels	7.25 7.50
Malleable	6.75 7.00

Foundry, by-product, Cleve-	
land, delivered	8.00
Foundry, Birmingham	8.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd	8.00

Coal

Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	\$1.80 to \$2.00
Mine run coking coal f.o.b. W. Pa. mines	2.05 to 2.12
Gas coal, 4-in. f.o.b. Pa. mines	2.25 to 2.32
Mine run gas coal f.o.b. Pa. mines	2.05 to 2.12
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.62
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00
No. 4 industrial	3.50
Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00
No. 4 industrial	3.50
Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.80
No. 5 industrial fuel oil	3.50
Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.50
No. 4 industrial	5.00
No. 5 industrial	4.00

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Web	
High-heat Intermediate Duty Brick	
Pennsylvania	\$45.00
Maryland	45.00
New Jersey	55.00
Ohio	45.00
Kentucky	45.00
Missouri	45.00
Illinois	45.00
Ground fire clay, per ton	7.00

Chrome Brick

Per Net Ton	
Standard size	\$45.00

Silica Brick

Per 1000 f.o.b. Web	
Pennsylvania	\$45.00
Chicago	50.00
Birmingham	50.00
Silica clay, per ton	7.00

Magnesite Brick

Per Net Ton	
Standard size, burned, f.o.b. Baltimore and Chester, Pa.	\$65.00
Unburned, f.o.b. Baltimore	55.00
Imported grain magnesite, f.o.b. Baltimore and Chester, Pa.	45.00
Domestic grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	3.15c
Structural shapes	3.15c
Soft steel bars and small shapes	2.90c
Reinforcing steel bars	2.90c
Cold-finished and screw stock:	
Rounds and hexagons	3.45c
Squares and flats	3.45c
Hoops and bands under 1/4 in.	3.20c
Hot-rolled annealed sheets (No. 24)	3.30c
25 or more bundles	3.30c
Galv. sheets (No. 24), 25 or more	3.35c
Hot-rolled sheets (No. 10)	2.95c
Galv. corrug. sheets (No. 28), per	
square (more than 3750 lb.)	\$3.69
Spikes, large	2.90c
Track bolts, all sizes, per 100 count	65 per cent off list.
Machine bolts, 100 count	65 per cent off list.
Carriage bolts, 100 count	65 per cent off list.
Nuts, all styles, 100 count	65 per cent off list.
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann'd, base per	
100 lb.	\$2.70
Wire, galv. soft, base per 100 lb.	\$2.925
Common wire nails, per keg	\$2.834
Cement coated nails, per keg	\$2.834

On plates, structural, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 999 lb.
*Delivered in Pittsburgh switching district.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c
Soft steel bars	2.95c
Cold-fn. steel bars:	
Rounds and hexagons	3.50c
Flats and squares	3.50c
Hot-rolled strip	3.30c
Hot-rolled annealed sheets (No. 24)	3.85c
Galv. sheets (No. 24)	4.55c
Hot-rolled sheets (No. 10)	3.05c
Spikes (keg lots)	3.05c
Track bolts (keg lots)	4.65c
Rivets, structural (keg lots)	3.65c
Rivets, boiler (keg lots)	3.75c
Per Cent Off List	
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts, sq. tap. or	
blank	60 and 5
Hot-pressed nuts, hex. tap or	
blank	60 and 5
Hex. head cap screws	80
Cup point set screws	70 and 10
Flat head bright wood screws, 3/16 and 10	
Spring cotter pins	50
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and	
smaller	57 1/2
Wrought washers	\$4.50 off list
No. 8 black ann'd wire per 100 lb.	\$3.85
Com. wire nails, base per keg	3.05
Cement c'd nails, base per keg	3.05

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

NEW YORK

	Base per Lb.
Plates, 1/4 in. and heavier	3.40c
Structural shapes	3.37c
Soft steel bars, small shapes	3.22c

Iron bars	3.22c
Iron bars, swed. charcoal	6.75c to 7.25c
Cold-fn. shafting and screw stock:	
Rounds and hexagons	3.92c
Flats and squares	4.42c
Cold-rolled: strip, soft and quarter	
hard	3.32c
Hoops	3.52c
Bands	3.52c
Hot-rolled sheets (No. 10)	3.27c
Hot-rolled ann'd sheets (No. 24*)	3.85c
Galvanized sheets (No. 24*)	4.50c
Long term sheets (No. 24)	5.20c
Standard tool steel	11.00c
Wire, black annealed (No. 10)	3.25c
Wire, galv. (No. 10)	3.85c
Tire steel, 1 x 1/2 in. and larger	3.65c
Open hearth spring steel, 4.00c to 10.00c	
Common wire nails, base, per keg	\$2.21

Machine bolts, cut thread:	Off List
All diameters	70
Carriage bolts, cut thread:	
All diameters	70
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.44c
Bars, soft steel or iron	3.19c
Cold-fn. rounds, shafting, screw	
stock	3.74c
Hot-rolled annealed sheets (No. 24)	4.09c
Galv. sheets (No. 24)	4.79c
Hot-rolled sheets (No. 10)	3.29c
Black corrug. sheets (No. 24)	4.09c
Galv. corrug. sheets (No. 24)	4.79c
Structural rivets	3.99c
Boiler rivets	4.09c
Per Cent Off List	
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws,	
fittings up bolts, bolt ends, plow bolts,	
hot-pressed nuts, square and hexagon,	
tapped or blank, semi-finished nuts:	
1000 lb. or over	70 and 10
200 to 999 lb.	67 1/2 and 10
100 to 199 lb.	65 and 10
Less than 100 lb.	60 and 10

*No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, 1/4-in. and heavier	2.95c
*Structural shapes	2.95c
*Soft steel bars, small shapes, iron	2.90c
*Bars (except bands)	2.90c
*Reinforce. steel bars, sq. twisted	2.95c
and deformed	2.95c
*Cold-finished steel bars	3.73c
*Steel hoops	3.40c
*Steel bands, No. 12 and 3/16 in.	
incl.	3.15c
Spring steel	5.00c
*Hot-rolled anneal. sheets (No. 24)	3.55c
*Galvanized sheets (No. 24)	4.25c
*Hot-rolled annealed sheets (No.	
10)	3.05c
Diam. pat. floor plates, 1/4 in.	4.95c
Swedish iron bars	6.25c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.
†For 50 bundles or over.
‡For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c
Soft steel bars	2.95c
Reinforce. steel bars	2.10c
Cold-finished steel bars	3.40c
Flat-rolled steel under 1/4 in.	3.36c
Cold-finished strip	3.00c
Hot-rolled annealed sheets (No. 24)	3.96c
Galvanized sheets (No. 24)	4.61c
Hot-rolled sheets (No. 10)	3.11c
Hot-rolled 3/16 in. 24 to 48 in. wide	
sheets	3.56c
Black ann'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.
†Outside delivery 10c. less.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.40c
Bars, soft steel or iron	3.15c
New billet reinforce. bars	3.25c
Rail steel reinforce. bars	3.25c
Hoops and bands, 3/16 in. and	
lighter	3.45c
Cold-finished bars	3.70c
Hot-rolled annealed sheets (No. 24)	4.00c
Galv. sheets (No. 24)	4.70c
Hot-rolled sheets (No. 10)	3.20c
Structural rivets	4.35c
No. 9 ann'd wire, per 100 lb. (1000	
lb. or over)	\$2.91
Com. wire nails, base per keg (1	
to 24 kegs)	3.50
25 to 50 kegs	3.30
Larger quantities	3.10
Cement c'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	8.35
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.	\$19.03
4-in.	44.96
Lap-welded steel boiler tubes, 2-in.	18.10
4-in.	42.32

BUFFALO

	Base per Lb.
Plates	3.27c
Struc. shapes	3.25c
Soft steel bars	3.00c
Reinforcing bars	2.60c
Cold-fn. flats and sq.	3.55c
Round and hex.	3.55c
Cold-rolled strip steel	3.19c
Hot-rolled annealed sheets (No. 24)	4.05c
Heavy hot-rolled sheets, 3/16 in.	
24 to 48 in. wide	3.62c
Galv. sheets (No. 24)	4.70c
Bands	3.42c
Hoops	3.42c
Hot-rolled unannealed sheets	3.17c
Com. wire nails, base per keg	\$3.25
Black wire, base per 100 lb.	3.55c

BOSTON

	Per Lb. Base
Beams, channels, angles, tees, zees	3.52c
H beams and shapes	3.52c
Plates—sheared, tank and univ.	
mill, 1/4 in. thick and heavier	3.53c
Floor plates, diamond pattern	5.33c
Bar and bar shapes (mild steel)	3.30c
Bands 3/16 in. thick and	
No. 12 ga. incl.	3.80c to 4.60c
Half rounds, half ovals, ovals and	
bevels	4.55c
Tire steel	4.55c
Cold-finished rounds and hexagons	5.25c
Cold-rolled strip steel	3.245c

Cold-finished squares and flats 4.30c.
Blue annealed sheets, No. 10 gal. 5.60c.
One pass cold-rolled sheets No. 24
ga. 4.15c.
Galvanized steel sheets, No. 24 ga. 4.85c.
Lead coated sheets, No. 24 ga. 5.80c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.31c
Soft steel bars	3.06c
Hot-rolled strip	3.41c
Hot-rolled sheets (No. 10)	3.16c
Hot-rolled annealed sheets (No. 24)	3.96c
Galvanized sheets (No. 24)	4.61c
Cold-finished steel bars	4.36c
Cold-rolled strip	3.30c
Structural rivets (keg lots)	3.86c
Roller rivets (keg lots)	3.96c
Track spikes (keg lots)	3.71c
Track bolts (keg lots)	4.86c
Black annealed wire	3.16c
Com. wire nails	2.90c
Cement coated nails	2.90c
Per Cent Off List	
Machine bolts (100 pcs. and over)	65
Carriage bolts (100 pcs. and over)	65
Hot-pressed nuts, sq. and hex.,	
tapped or blank (keg lots)	60 and 5

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 3499 lb. On cold-finished bars the prices are for orders of 300 to 499 lb.

PACIFIC COAST

	Base per Lb.	San Francisco	Los Angeles	Seattle
Plates, tank and				
U. M.	3.55c	3.70c	3.55c	
Shapes, standard	3.55c	3.70c	3.55c	
Soft steel bars	3.60c	3.70c	3.60c	
Reinforcing bars	3.50c	3.50c	3.50c	
Hot-rolled annealed				
sheets (No. 24)	4.40c	4.45c	4.40c	
Hot-rolled sheets				
(No. 10)	3.75c	3.80c	3.75c	
Galv. sheets (No.				
24)	5.00c	5.05c	5.00c	
Cold finished steel:				
Rounds	5.95c	5.95c	4.75c	
Squares and				
hexagons	7.20c	7.20c	6.00c	
Flats	7.70c	7.70c	7.00c	
Common wire nails				
base per keg	\$3.40	\$3.25	\$3.30	
less carload				

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

	Base per Lb.
High speed	57c
High carbon chrome	37c
Oil hardening	22c
Extra	17c
Regular	14c

Navy Buying Stainless And Armor Plate

WASHINGTON, Jan. 29.—The Navy Department has issued bids for 136½ tons of corrosion-resisting steel for cruisers, destroyers and submarines. On Feb. 1 bids will be opened by the Bureau of Supplies and Accounts for 14 tons of bars for two submarines building at the Portsmouth, N. H., while on Feb. 8 bids will be opened for two lots, one consisting of 56½

tons of sheets, plates, strips, angles and bars for the cruisers Brooklyn and Honolulu for delivery at the Brooklyn yard, and the other, consisting of 18 tons of sheets for destroyers, for delivery at the Puget Sound, Wash., Boston and Brooklyn yards. On Feb. 15 bids will be opened for 66 tons of bars, plates and sheets for destroyers, submarines and the cruisers Brooklyn and Honolulu for delivery at various yards.

Bids were opened Jan. 28 by the Bureau of Ordnance, Navy Depart-

ment, for 1450½ tons of armor plate for three cruisers. The Carnegie Steel Co. was low bidder on 905.79 tons, the Midvale Co., on 281.31 tons, and the Bethlehem Steel Co. on 263.44 tons. The Carnegie company was low on all the Class A armor, totaling 66½ tons at \$695 per ton. Low bids on the other tonnages ranged from \$360 to \$545 per ton.

The Navy Department will open bids Feb. 19 for 200 tons of steel sheets for cruisers and destroyers being built at various navy yards.

January Copper Sales Quota Likely To Be Covered—Other Metals Quiet

Activity in Tin Is Rather Disappointing in Face of Increasing Consumption—Zinc Reduced \$1 a Ton—Lead Buying Is for Current Needs Only

NEW YORK, Jan. 29.—With copper sales continuing to average more than 1000 tons daily, bookings thus far in January have amounted to more than 25,000 tons, and it seems likely that the industry will be able to dispose of its full sales quota for the month. The effect on this market would not be appreciable, but less metal would be available for disposal abroad where the market has been very weak in the last few days. At London this morning, copper was quoted at 6.72½c. to 6.75c. a lb., usual Continental base ports, a decline of five points from yesterday's figures. The Blue Eagle price, of course, is unchanged at 9c. a lb., Connecticut Valley. The market here is devoid of significant developments, although consumption seems to be rising steadily.

Lead

This market is rather quiet, although sellers are having no difficulty disposing of their current intake through sales for immediate delivery. Buyers are showing no interest in their future requirements and business is confined almost entirely to February metal. In some cases sellers' books have not been opened for March. Quotations of 3.55c., St. Louis, and 3.70c., New York, are well maintained and have not changed since the middle of December. The Joplin ore market is holding at \$36 a ton. Production last week amounted to about 700 tons, with shipments at 575 tons, while stocks at the end of the week were estimated at 13,900 tons.

Zinc

After holding for several days at 3.75c. a lb., East St. Louis, and 4.10c., New York, the market eased off five points last week, and now seems to be reasonably well established at 3.70c. and 4.05c. respectively, for the Prime Western grade. Sellers at these figures are not entirely lacking, although metal is not plentiful at such levels, which are below the cost of production for practically everyone. Transactions last week amounted to about 2300 tons, compared with only about 1000 tons in the previous seven-day period. The market for concentrates is well sustained at \$25 and \$26 a ton. Inclement weather last week reduced production to about 4000 tons, or about half of the recent average. Sales amounted to 6800 tons.

Railroad Equipment

Barrett Co. has ordered six tank cars from American Car & Foundry Co.

Norfolk & Western Railroad Co. plans construction of new line to coal field district in Buchanan County, Va., about 39 miles. Cost close to \$3,500,000 with equipment.

Cincinnati, New Orleans & Texas Pacific, division of Southern Railway system, is taking bids until Feb. 5 for 300 40-ton automobile box cars. Cars will be designed by carrier, which is not considering lightweight steel on present inquiry.

Chicago, Burlington & Quincy has placed order with Pressed Steel Car Co. for five light-weight steel hopper cars for test purposes.

RAILS

Louisville & Nashville has purchased 15,000 tons of rails from Tennessee Coal, Iron & Railroad Co.

Atlantic Coast Line contemplates purchasing 5000 tons of rails.

Reinforcing Steel

New Projects—9050 Tons

NEW REINFORCING BAR PROJECTS

Zanesville, Ohio, 2400 tons, six dams for Muskingum Conservancy District; bids to be taken by United States Engineers, Zanesville, Feb. 5. Previous bids on 1000 tons rejected.

San Francisco, 150 tons additional, Glenn Park school; bids under advisement.

Los Angeles, 7030 tons, material for Metropolitan Water District, Specification No. 87; bids Feb. 11.

St. Louis, 450 tons, fourth unit of Homer Phillips city hospital; bids Feb. 5.

PIERCE, BORCHERDING & QUIRK, INC., has succeeded the business of Fitz, Dana & Brown, 441 Pearl Street, New York, and will continue to deal in non-ferrous metals of all kinds. Harold R. Pierce is president of the new company. James H. Quirk, vice-president, and William F. Borcharding, secretary-treasurer.

The Week's Prices. Cents Per Pound for Early Delivery

	Jan. 23	Jan. 24	Jan. 25	Jan. 26	Jan. 28	Jan. 29
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, New York	51.00	51.10	50.90		50.70	50.95
Zinc, East St. Louis	3.70	3.70	3.70	3.70	3.70	3.70
Zinc, New York	4.05	4.05	4.05	4.05	4.05	4.05
Lead, St. Louis	3.55	3.55	3.55	3.55	3.55	3.55
Lead, New York	3.70	3.70	3.70	3.70	3.70	3.70

*Refinery quotations; price ¼c. higher delivered in Connecticut.
Aluminum, virgin 99 per cent plus, 19c. to 22c. a lb., delivered.
Aluminum, remelt No. 12 (alloy), carload lots delivered, 14c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 14.50c. a lb., New York.
Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

From New York Warehouse	
Delivered Prices, Base per Lb.	
Tin, Straits pig	52.25c. to 53.25c.
Tin, bar	54.25c. to 55.25c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.25c.
*Seamless brass tubes	16.00c.
*Seamless copper tubes	16.25c.
*Brass rods	12.75c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.25c.
Antimony, Asiatic	15.50c. to 16.50c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	30.00c. to 31.00c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse	
Delivered Prices per Lb.	
Tin, Straits pig	54.25c.
Tin, bar	56.25c.

Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slab	5.50c. to 5.75c.
Lead, American pig	4.70c. to 4.95c.
Lead, bar	7.75c.
Antimony, Asiatic	16.50c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	59.50c.
Solder, ½ and ½	33.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	5.50c.	6.25c.
Copper, hvy. and wire	5.37½c.	5.87½c.
Copper, light and bottoms	4.37½c.	4.87½c.
Brass, heavy	2.87½c.	3.50c.
Brass, light	2.12½c.	2.87½c.
Hvy. machine composition	4.37½c.	4.87½c.
No. 1 yel. brass turnings	3.75c.	4.25c.
No. 1 red brass or compos. turnings	4.00c.	4.50c.
Lead, heavy	2.62½c.	3.00c.
Zinc	1.87½c.	2.25c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.

Pipe Lines

Lyons, Kan., plans steel pipe line system for municipal gas distribution. Special election has been called for Feb. 4 to approve bond issue of \$75,000 for project. F. E. Devlin, Wheeler-Kelly-Hagney Building, Wichita, Kan., is consulting engineer.

Michigan Gas & Electric Co., Mount Pleasant, Mich., care of H. T. Sarkerson, Mount Pleasant, engineer, recently organized, plans welded steel pipe lines from Mount Pleasant-Midland gas fields to Lansing, Flint, Pontiac and Detroit for natural gas. Cost close to \$5,000,000. Application has been made to Michigan Public Utilities Commission for permission and hearings are now being held.

Wisconsin Steam Corp., 335 McKinley Avenue, Eau Claire, Wis., Sidney P. Hall, vice-president and general manager, plans steel pipe lines for steam distribution for heating from new central steam power plant. Site for power house has been secured on Dewey Street. Work will begin early in spring. Cost about \$200,000 with power plant.

Hooker, Okla., plans steel pipe lines for gas distribution in connection with new municipal gas plant. Cost about \$50,000. F. E. Devlin, Wheeler-Kelly-Hagney Building, Wichita, Kan., is consulting engineer.

Virginia, Minn., plans steel pipe installation for gas distribution, replacing parts of present system.

United States Engineer Office, Federal Building, Milwaukee, closed bids Jan. 30 for welded steel pipe, wrought steel pipe and galvanized steel pipe, including welded steel couplings and other fittings (Circular 117).

Cast Iron Pipe

Yonkers, N. Y., will readvertise for 2000 tons of pipe and fittings.

Burlington, N. J., has purchased 225 tons of 12 and 8-in. from United States Pipe & Foundry Co.

Warrior, Ala., asks bids until Feb. 20 for water pipe lines and other waterworks equipment. Fund of \$38,000 has been arranged through Federal aid.

Frisco City, Ala., plans water pipe lines and other waterworks construction. Fund of \$35,000 has been secured through Federal aid.

Ogden, Utah, plans extensions and replacements in water pipe lines and other waterworks construction, including improvements in present plant. Bond issue of \$586,000 has been sold, to apply on total PWA fund of \$750,000 secured for entire project. Claude Cory, Ogden, is engineer.

Paris, N. Y., asks bids until Feb. 12 for water pipe line system, including 200,000-gal. steel pipe and reservoir. W. T. Field Engineers, Inc., Watertown, N. Y., is consulting engineer.

Tigerton, Wis., plans water pipe line system; also new pumping station and water tower. Bonds for \$50,000 have been approved at special election. Druar & Millinowski, Globe Building, St. Paul, Minn., are consulting engineers.

Woodville, Miss., asks bids until Feb. 5 for 3000 ft. of 2 1/2-in. galvanized pipe and quantity of fittings.

Lawton, Okla., plans new 10-in. line from city to Fort Sill Indian School and Kiowa Indian Hospital, replacing present 4-in. main. Work will be carried out under Federal supervision.

Butler, Ohio, plans water pipe lines; also other waterworks construction. Fund of \$40,000 has been arranged through Federal aid. North Central Ohio Engineering Co., Mansfield, Ohio, is consulting engineer.

Berry, Ala., closes bids Feb. 13 for pipe lines for water distribution and other wa-



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terworks installation. Fund of \$35,000 has been authorized.

Thompson Falls, Mont., plans pipe lines for extensions and replacements in present system, and other waterworks construction. Fund of \$50,000 is being arranged.

Milwaukee closes bids Feb. 7 on about 100 tons special castings, offsets, valve boxes, gate valves, etc., and 250 fire hydrants.

Princeton, Wis., will hold special election March 5 on bond issue of \$100,000 covering Federal loan allotted for construction of waterworks and sewerage system. A. E. McMahon Engineering Co., Menasha, Wis., is in charge.

Oakland, Cal., has placed 238 tons of 4 and 6-in. with United States Pipe & Foundry Co.

Los Angeles has awarded 160 tons to National Cast Iron Pipe Co. and 187 tons to Florence Pipe Foundry & Machine Works.

San Rafael, Cal., has let 113 tons of 6 and 8-in. to United States Pipe & Foundry Co.

Burlingame, Cal., will take new bids on a sewage disposal plant and other work which includes 100 tons.

Victorville County Water District of Victorville, Cal., has been allotted a PWA loan and grant for a waterworks system which will include 352 tons of 4 and 6-in.

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Fabricated Structural Steel

Lettings Light—New Projects in Small Volume

STRUCTURAL steel awards of 5250 tons are the lowest since the first week in December. The only sizable booking is 1000 tons for work on the Ogden River in Utah for the Bureau of Reclamation. New projects of 9400 tons compare with 16,150 tons last week and 19,700 tons two weeks ago. The bulk of inquiries is for public work and includes 1000 tons each for a school at Tottenville, Staten Island, and for service and emergency gates at Sheffield, Ala., for the Tennessee Valley Authority. Plate awards total about 1200 tons. New plate projects, at 13,100 tons, include 12,500 tons of ingot iron for a pipe line at Rio de Janeiro, Brazil. Structural steel contracts in January were 55,860 tons compared with 31,500 tons in December and 64,025 tons in November. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Lawrenceville, Pa., 450 tons, State highway bridge, to American Bridge Co.

Baltimore, 570 tons, Coca Cola Co. warehouse, to Ingalls Iron Works.

THE SOUTH

Monroe, La., 155 tons, bridge girders, to American Bridge Co.

CENTRAL STATES

Cleveland, 400 tons, extension for Steel & Tubes, Inc., to Truscon Steel Co., through Austin Co., general contractor.

Douglas County, Ill., 255 tons, beam bridge, to Mississippi Valley Structural Steel Co.

Lemont, Ill., 415 tons, bridge extension, to Duffin Iron Co.

Palisade, Ill., 125 tons, bridge, to McClintic-Marshall Corp.

Shirland, Ill., 180 tons, State highway bridge, to Midland Structural Steel Co.

Carpentersville, Ill., 170 tons, State highway bridge, to Midland Structural Steel Co.

Cowling, Ill., 100 tons, bridge, to Vincennes Bridge Co.

Sioux Falls, S. D., 200 tons, city hall, to Hassenstein Steel Co.

Red River, Wis., 300 tons, bridge, to McClintic-Marshall Corp.

Shawnee County, Kan., 350 tons, bridge, to Missouri Valley Bridge & Iron Co.

WESTERN STATES

Akron, Colo., 150 tons, State highway bridge, to American Bridge Co.

State of Utah, 1000 tons, for Ogden River work, awarded by United States Bureau of Reclamation, to John W. Beam and others.

Oakland, Cal., 185 tons, Jergens office building, to Herrick Iron Works.

Oakland, 138 tons, bridges for United States Forest Service, to Pacific Coast Steel Corp. and Judson-Pacific Co.

Juneau, Alaska, 100 tons, bridge over Lemon Creek, to an unnamed bidder.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Long Island City, N. Y., 300 tons, Greenpoint Hospital building: bids taken Jan. 30.

Tottenville, S. I., 1200 tons, high school, bids Feb. 7.

New York, 8000 tons, section of West Side express highway; Poirier & McLane Corp., general contractor.

New York, 1650 tons, New York Central Railroad, track depression; P. T. Cox Contracting Co., general contractor.

Bayonne, N. J., 700 tons, high school.

Wilson, N. Y., 100 tons, school; bids Feb. 4.

Olean, N. Y., 800 tons, high school; bids February or March (PWA project).

THE SOUTH

Virginian Railway, 175 tons, bridge at Wyoming, W. Va.

Sheffield, Ala., 1200 tons, service and emergency gates for Tennessee Valley Authority.

CENTRAL STATES

Troy, Ohio, 300 tons, addition for Gummed Products Co.

Chicago, 450 tons, malt house for Fleischmann Malting Co.

Chicago, 200 tons, industrial building.

State of Illinois, 2300 tons, bridges; bids to be taken Feb. 8.

Minneapolis, tonnage being estimated, armory.

State of Missouri, 400 tons, four highway bridges.

WESTERN STATES

Helena, Mont., 700 tons, bridges.

Boulder Dam, Nev., 150 tons, gates; bids taken Jan. 28.

Idaho County, Idaho, 206 tons, Bureau of Public Roads bridge over Kooskia River; bids soon.

Almira, Wash., 200 tons, building; bids under advisement.

Almira, 120 tons, three warehouses at Grand Coulee dam; bids Feb. 11.

State of California, 200 tons, crane runway for Bureau of Yards and Docks.

FABRICATED PLATE

AWARDS

Philadelphia, 195 tons, four tanks for Continental Distilling Co., to Chicago Bridge & Iron Works.

St. Louis, 140 tons, 20-in. discharge pipe, awarded by United States Engineers to Treadwell Construction Co.

Wausau, Wis., 850 tons, tanks, to Wausau Iron Works.

NEW PROJECTS

Fairport, Ohio, 390 tons, 3300 ft. of 6-ft. pipe for Diamond Alkali Co.

Boulder City, Nev., 200 tons, tanks.

Rio de Janeiro, Brazil, 12,500 tons of ingot iron, for pipe line.

Republic Restores 5½-Day Week

THE Republic Steel Corp. will restore the 5½-day week for its office and clerical employees on Feb. 1. This change affects 2700 salaried employees in the corporation's general, sales and works offices in various districts and is also effective in offices of subsidiaries. The 5-day week for salaried employees has been in effect since Sept. 1, 1934.

British Pig Iron Output Still Rising — Strikes in French Works

LONDON, ENGLAND, Jan. 28 (By Cable). — Specifications and inquiries for pig iron have increased and export business is better. Output is being fully absorbed, and the early relighting of additional hematite furnaces is expected. The limit in expansion is believed not yet to have been reached.

Semi-finished steel production is well maintained and finishing mills are busy, although new business is more quiet. South Africa and Argentina are buying rails and Russia, plates.

The recent Far Eastern Mission of the Federation of British Industries has received a written undertaking in connection with imminent large Manchukuo contracts.

Tin plates demand for both home and export is quiet, and bookings are equal to only about half of production.

Continental iron and steel markets are very quiet. The Far East

British Prices, f.o.b. United Kingdom Ports Per Gross Ton

Ferromanganese, export	£9	
Billets, open-hrth.	£5 10s.	to £5 15s.
Tin plate, per base box	*18s.	2d. to 18s. 9d.
Steel bars, open-hearth	£7 17½s.	
Beams, open-hrth.	£7 7½s.	
Channels, open-hearth	£7 12½s.	
Angles, open-hearth	£7 7½s.	
Black sheets, No. 24 gage	£9 5s.	
Galvanized sheets, No. 24 gage	£11 5s.	

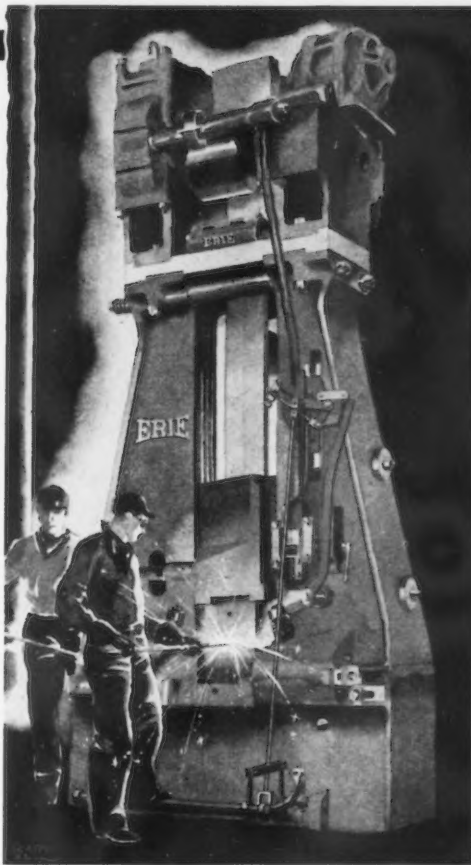
*To May 1: 18s. 5d. to 19s. thereafter.

Official Continental Prices, f.o.b. Continental Ports Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange

Billets, Thomas ..	£2 7s.	
Wire rods, No. 5 B.W.G.	£4 10s.	
Steel bars, merchant	£3 5s.	
Sheet bars	£2 8s.	
Plate, ¼ in. and up	£4	
Plate, 3/16 in. and 5 mm.	£4 2s. 6d.	
Sheets, ¼ in.	£4 7s. 6d.	
Beams, Thomas ..	£3 2s. 6d.	
Angles (Basic) ..	£3 2s. 6d.	
Hoops and strip base	£4 2s. 6d.	
Wire, plain, No. 8 ..	£5 7s. 6d.	
Wire nails	£5 15s.	
Wire, barbed, 4-pt. No. 10 B.W.G. ..	£8 15s.	

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is well covered in anticipation of freight increases Feb. 1. The Cartel has reduced prices on semi-finished steel to Japan by 2s. gold to counter American competition.

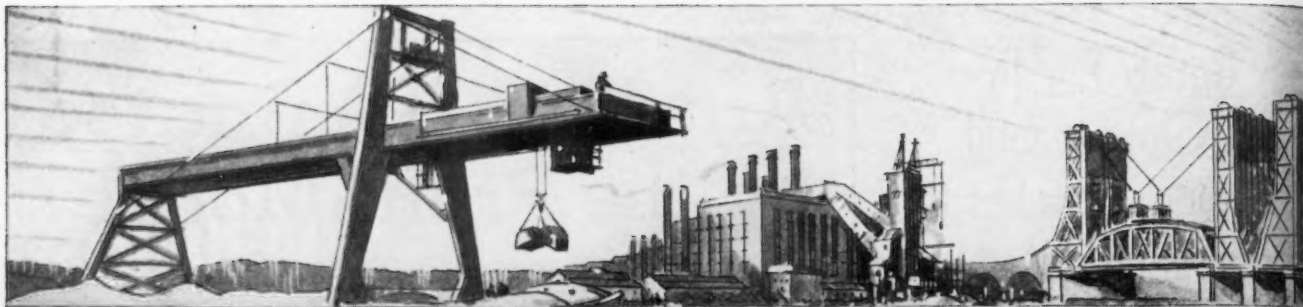
Hamburg exporters have expressed dissatisfaction with the International Raw-Steel Cartel, stating that much business is being lost because of the exhaustion of German quotas.

The French Hainaut works has blown in two furnaces. Strikes are hampering two large French works. South Africa has imposed

dumping duties on imports of steel from Belgium, Germany, France and Luxemburg.

Discord Breaks Out in Amalgamated Ranks

PLANS of "rank and file" members of the Amalgamated Association of Iron, Steel and Tin Workers to hold a meeting Feb. 3 have caused officers of the organization to send out a letter announcing that such a meeting is without official sanction.



PLANT EXPANSION AND EQUIPMENT BUYING

Railroad Inquiry Enlivens Machine Tool Trade—Other Demand Holding

THE Atchison, Topeka & Santa Fe Railroad has come into the market for a radial drill, a vertical surface grinder and a universal grinding machine.

While the inquiry is not exceptionally large, the appearance of demand from the railroads is of particular interest to the machine tool trade at this time. If the other carriers follow the lead of the Santa Fe, machine tool demand might be said to be coming from all the usual major sources.

Machine tool orders during January have not been as large as was the case during December when large orders were placed by the Army Ordnance Department. However, inquiry is well sustained and buying promises to be brisk during the spring months.

◀ NORTH ATLANTIC ▶

Texas Co., 135 East Forty-second Street, manufacturer of refined oils, etc., has approved plans for one-story oil-canning plant at Choctaw Point, Mobile, Ala. Cost over \$60,000 with equipment. Edward Merren, at plant site, will be in charge of construction and operations.

Liberty Plumbers Supply Co., Inc., 20 William Street, Stapleton, S. I., Edward I. Levine, has acquired two-story building at 1094 Castleton Avenue, West New Brighton, S. I., 40 x 140 ft., including adjoining site, 25 x 100 ft., and will remodel for new storage and distributing plant, including pipe shop and other departments.

Hickman Sea Sled Co., Inc., New York, has been organized by Joseph F. Sullivan, 167 Sands Street, Brooklyn, and Richard Crown, 2515 Grand Concourse, Bronx, to manufacture seaplanes, parts and other aircraft and watercraft.

Central School District, Harpersville, N. Y., plans manual training department in new multi-story high and grade school, for which bids are being asked on general contract. Fund of \$173,000 has been arranged through Federal aid. R. R. Graham, Middletown, N. Y., is architect; E. E. Seelye & Co., 101 Park Avenue, New York, are consulting engineers.

North American Die Works, 35 Great Jones Street, New York, manufacturer of steel dies, etc., has leased a floor in building at 10 Washington Place, for new plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 5 for 21 fuel oil service pumps and accessory equipment (Schedule 4128), 14 motor-driven centrifugal pumps and spare parts (Schedule 4127) for Brooklyn, Philadelphia and Charleston navy yards; 12,000 lb. steel packing case strapping (Schedule 4144) for Brooklyn and Sewall's Point yards; 24,500 lb. steel wool (Schedule 4142) for Brooklyn, Boston, Philadelphia and other yards; until Feb. 8, corrosion-resisting sheet steel (Schedule 4168) for Brooklyn and Puget Sound yards; electric cable, wire and cord (Schedule 4152) for Brooklyn yard; until Feb. 12, two refrigerating plants and spare parts (Schedule 4174) for Brooklyn and Charleston yards.

Signal Supply Officer, Army Base, Brooklyn, asks bids until Feb. 4 for quantity of coils (Circular 76); until Feb. 11, resistors, contacts, contactor coils, armatures, fuses, vacuum tube mountings, transformer and other equipment (Circular 71).

Kegeo Products Corp., New York, has leased space in building at 36-38 West Twentieth Street, for manufacture of electric lamps, fittings, etc.

Board of Education, Yorktown Heights, N. Y., plans manual training department in new two-story school, for which bids will soon be asked on general contract. Fund of \$310,000 has been arranged. Knapp & Morris, 192 Lexington Avenue, New York, are architects.

John A. Roebling's Sons Co., Trenton, N. J., manufacturer of steel cable, wire rope, etc., has plans for one-story branch plant at California City, near Tiburon, Cal., 100 x 535 ft., for manufacture of steel cables, for which company has secured large contract in San Francisco district. Cost over \$100,000 with equipment. Pacific Coast offices are at 646 Folsom Street, San Francisco.

Hudson Wholesale Grocery Co., 123 First Street, Jersey City, N. J., has engaged W. V. Davidson Corp., 320 East Forty-second Street, New York, consulting engineer, to draw plans for new one-story storage and distributing plant, about 75,000 sq. ft. floor space. Cost over \$150,000 with mechanical-handling and other equipment.

Sheet Metal Products, Inc., East Orange, N. J., has been organized under direction of Donald Karrakis, 6 Harrison Street, representative, to manufacture sheet metal specialties.

Campbell Soup Co., Camden, N. J., has purchased two-story factory at Jersey City, N. J., occupying entire block front, formerly used by DeForest Radio Co., and will use for new factory branch, storage and distributing plant.

Philadelphia Electric Co., Tenth and Chestnut Streets, Philadelphia, has arranged appropriation of \$8,800,000 for construction and improvements during 1935, including completion of addition to Richmond generating plant to cost \$4,200,000, on which work is now under way, extensions in transmission and distribution lines, substations and other structures.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 5 for one motor-driven pipe-threading and cutting machine (Schedule 4151); until Feb. 8, 8000 ft. rubber-insulated welding electric cable (Schedule 4188), 250 vibration-absorbing mounts (Schedule 4185) for Philadelphia Navy Yard.

Board of Public Education, Eleventh and Washington Streets, Wilmington, Del., Floyd E. Booth, business manager, asks bids until Feb. 11 for manual training equipment for new Pierre S. du Pont High School.

◀ NEW ENGLAND ▶

Commanding Officer, Springfield Armory, Springfield, Mass., asks bids until Feb. 4 for five motors, magnetic starters, compensator, etc. (Circular 61); until Feb. 5 for gage blanks (Circular 65).

Connecticut Precast Building Corp., South Norwalk, Conn., manufacturer of standardized building sections and materials, has leased foundry No. 4, of Norwalk Co., Inc., totaling about 40,000 sq. ft. floor space for new plant.

Economical Tool Die Mfg. Processes, Inc., Bridgeport, Conn., has been organized by Daniel J. Williams, Fairfield, Conn., and Lester W. Nelson, Bridgeport, to manufacture tools, dies and kindred equipment.

Birdseye Electric Co., Gloucester, Mass., recently organized by Clarence Birdseye, Gloucester, and associates, to manufacture electric lamps and allied products, has taken over former factory of General Seafoods Co. for plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 5 for 960 alloy steel forgings (Schedule 4143) for Newport, R. I., Navy Yard.

Rivett Lathe & Grinder, Inc., Boston, has been organized, capital \$100,000, by Thorvald S. Ross and Frederick C. Blanchard, president and vice-president respectively, to manufacture precision lathes, grinders, parts, etc. New company will take over Rivett Lathe & Grinder Corp., 2 Brooks Street, Brighton, Boston.

◀ OHIO AND INDIANA ▶

Cedar Valley Distillery, Wooster, Ohio, will soon take bids on general contract for five-story and basement addition, 50 x 60 ft., for storage and distribution. Cost about \$40,000 with mechanical-handling and other equipment. Company also plans another multi-story unit, about 70 x 100 ft., to cost over \$50,000 with equipment, for similar service. W. G. Lanphear & Son, 11 Court Street, Buffalo, are architects.

Grasselli Chemical Co., Guardian Building, Cleveland, is considering addition to local plant for production of silicate of soda and allied industrial chemicals. Cost over \$60,000 with equipment.

City Council, Niles, Ohio, has surveys and estimates of cost under way by Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., consulting engineer, for new municipal electric light and power plant. Cost over \$200,000 including equipment.

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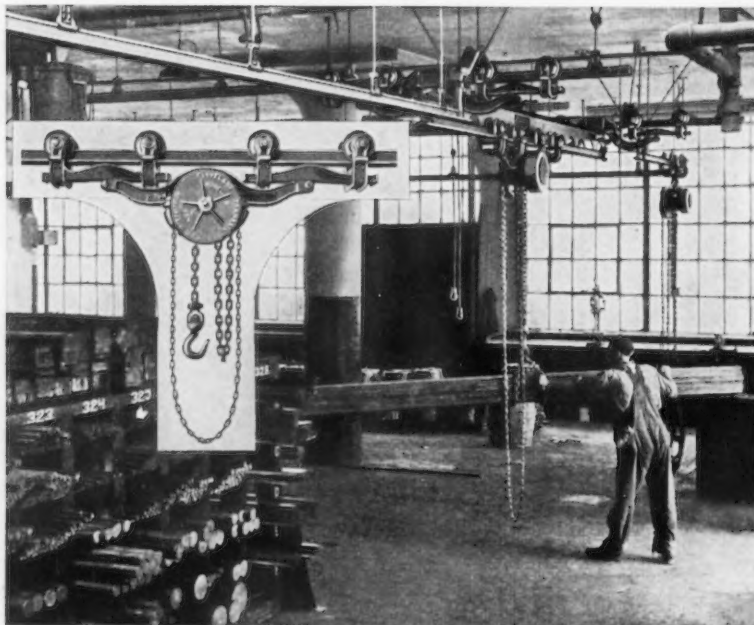


Wickwire Spencer manufactures High and Low Carbon Wires—in various tempers, grades and finishes—for your specific purpose. Hard-Drawn, soft or annealed Basic or Bessemer Wires—Hard-Drawn annealed, or oil-tempered Spring Wire, Chrome Vanadium Spring Wire—Valve Spring—Music—Clip—Pin—Hairpin—Hook and Eye—Broom—Stapling—Bookbinding—

Machinery Spring Wire—Reed Wire—Clock—Pinion—Needle—Bar—Screw Stock—Armature Binding—Brush—Card—Florist—Mattress—Shaped—Rope—Welding. Flat Wire and Strip Steel, High or Low Carbon—Hard, annealed or tempered—Clock Spring Steel—Corrosion and Heat Resisting Wires. Consult the Wissco technical man on your wire problems, however large or small.

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All Cleveland Tramrail carriers are built on the principle of a four wheel unit which combined with the long wheelbase causes them to operate smoothly at all times, even around curves of short radii, and eliminates all tendency to hop along the rail.

Wheels are cast iron with flat deep chilled tread and chilled flange, double race ball bearings, factory lubricated for life and sealed against dust and dirt.

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Two point king pin support of the load bar.

Load bars pressed steel welded.

Forged steel eye bolts with a hardened steel seat under the forged head.

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Hand or Electric
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Transportation Equipment

DIVISION OF

THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE OHIO

Molded Alloys, Inc., Dayton, Ohio, has been organized by A. H. Bergadick and John W. Ratchford, 25 North Main Street, to manufacture metal alloy products.

City Council, Kenton, Ohio, has plans for new municipal electric light and power plant, including electrical distribution system. Cost about \$550,000. Financing is being arranged. H. P. Jones, Second National Bank Building, Toledo, Ohio, is engineer.

Material Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Feb. 4 for one battery charger, motor-generator type (Circular 445); until Feb. 7, 20 precision-type ohmmeters (Circular 443); until Feb. 8, 1386 running lamp assemblies and 924 running lamp reflectors (Circular 447); until Feb. 11, 453 vacuum pump assemblies (Circular 453); until Feb. 12, 231 battery assemblies (Circular 435); until Feb. 15, 261 tachometer assemblies (Circular 448).

Decatur Packing Co., Greenwood, Ind., C. M. Winchester, Greenwood, head, has acquired 10 acre tract at Greensburg, Ind., as site for new food canning plant, consisting of main one-story canning factory and two-story storage and distributing building. Cost over \$60,000 with equipment. Bids will be asked soon on general contract.

Board of Public Works, City Hall, Indianapolis, plans installation of pumping machinery, air compressors, air filters, boilers, tanks and other equipment in new municipal sewage disposal works near city, for which bids will be asked soon. Fund of \$500,000 is being secured through Federal aid. Charles Hurd, Architects' Building, is consulting engineer; A. H. Moore, City Hall, is city engineer.

◀ BUFFALO DISTRICT ▶

Board of Education, City Hall, Buffalo, asks bids until Feb. 13 for steel lockers for Boys' Continuation School, 280 Oak Street. James Storer is secretary.

Erie Railroad Co., 50 Church Street, New York, is planning removal of car and locomotive repair shops from Meadville, Pa., to Hornell, N. Y., where units will be consolidated with present shops and expansion carried out. Change is scheduled to be made by April.

Wilber Vending Machine Corp., Syracuse, N. Y., has been organized by Paul F. Wilber, Richland, N. Y., and R. George Roesch, 407 Stolp Avenue, Syracuse, to manufacture vending machines and parts.

General Dry Batteries of Canada, Ltd., 1244 Dufferin Street, Toronto, manufacturer of electric storage batteries, parts, etc., subsidiary of General Dry Batteries, Inc., Cleveland, has leased building at St. Helens Avenue and Dora Street, totaling 30,000 sq. ft. floor space, and will remodel for new plant. About double amount of present floor space will be provided at new location.

◀ SOUTHWEST ▶

Standard Oil Co., 2 West Fortieth Street, Kansas City, Mo., plans new bulk oil storage and distributing plant at Twentieth and Harrison Streets. Cost about \$35,000 with tanks and pumping plant.

Apache Paint & Chemical Co., 107 East California Avenue, Oklahoma City, manufacturer of fireproof paints and allied products, plans installation of grinding mills, mixing machines, conveyors and other equipment.

Common Council, Elk City, Okla., plans installation of pumping machinery and auxiliary equipment, pipe lines, etc., for new municipal water system. Bond issue of \$300,000 has been approved at special election. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

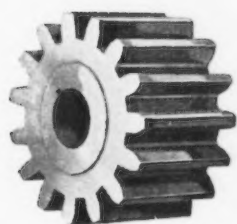
Board of Education, Kansas City, Mo., plans manual training department in new two-story high school at Meyer Boulevard and Swope Parkway. Cost about \$600,000. Wight & Wight, First National Bank Building, are architects.

Georgetown Oil Mills, Inc., Georgetown, Tex., plans rebuilding part of cottonseed oil mills recently destroyed by fire. Loss close to \$85,000 with equipment.

Fehr Baking Co., 4100 Leland Avenue, Houston, Tex., has let general contract to Tellepsen Construction Co., 3900 Clay Street, for one-story addition, 130 x 150 ft. Cost over \$60,000 with ovens and other equipment, conveyors, etc.

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FROM



DRIVING GEARS

TO DREADNAUGHTS



for Strength, Hardness, Shock Resistance

Chromium is the most useful of all alloying elements in steel practice. It is represented in the chemical composition of a majority of alloy steels. It is universally specified for increased hardness and resistance to shock and higher tensile strengths.

Electromet can provide the proper ferrochrome for alloy additions to any type of chromium steel.

Electromet Metallurgists will gladly demonstrate the advantages of chromium alloy steels.

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Sheet metal satisfaction begins with YOUR sheet metal decision. You always lose when you take chances with Wear, Weather and Corrosion, these three arch enemies of sheet metal, whose toll mounts into millions annually.

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SHEET METAL
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 Produced exclusively by
 The Newport Rolling Mill Co.,
 Newport, Ky.

Premier Oil & Refining Co. of Texas, Inc., Kilgore, Tex., recently organized by J. R. Parten, Shreveport, La., and associates, plans new gasoline refinery near Kilgore, with initial capacity of about 2500 bbl. per day. Cost over \$75,000 with equipment.

Board of Education, Fort Worth, Tex., plans manual training department in new Rosemont junior high school, for which bids will be asked late in February. Cost over \$200,000. Elmer G. Withers Architectural Co., and E. A. Van Horn, both Holmes Building, are architect and consulting engineer respectively.

◀ MIDDLE WEST ▶

Glidden Co., 1845 North Laramie Avenue, Chicago, manufacturer of paints, oils, varnishes, etc., has taken out permit for four-story addition, 35 x 70 ft. Cost about \$40,000 with equipment. N. Ronneberg, Inc., 10 South LaSalle Street, is consulting engineer. Company headquarters are at Cleveland.

Imperial Die-Casting Co., 4717 West North Avenue, Chicago, manufacturer of die-castings and allied products, has leased one-story building at Fulton and Francisco Streets, totaling about 15,000 sq. ft. floor space for new plant, increasing present capacity.

Wetzig Mfg. Co., 2600 Fletcher Street, Chicago, has been organized by Alfred Wetzig and associates, to manufacture steam and gas engine specialties, parts, etc.

Dubuque Star Brewing Co., Fourth Street Extension, Dubuque, Iowa, is considering multi-story addition for increased capacity. Cost over \$40,000 with machinery.

School District No. 2, Yellowstone County, Billings, Mont., plans manual training department in new three-story and basement high school, for which bids will be asked soon on general contract. Fund of \$250,000 has been arranged through Federal aid. McIver & Cohagen, Hedden Building, are architects.

International Milling Co., Flour Exchange Building, Minneapolis, Minn., plans new grain elevator on site being selected in Canada. Work will begin in spring. Cost about \$100,000 with elevating, conveying, screening and other mechanical equipment. William J. Gordon, address noted, is company engineer.

All-Metal Card Table Corp., 111 West Lake Street, Chicago, has been organized by C. J. Madden and S. E. Durand, to manufacture metal furniture specialties.

Bureau of Reclamation, Denver, asks bids until Feb. 15 for four flow meters for measuring flow of water through 115,000-hp. hydraulic turbines, and one such flow meter for 55,000-hp. hydraulic turbine, two portable manometers, tool cabinets, etc. (Specification 657-D).

Wisconsin Steam Corp., 335 McKinley Avenue, Eau Claire, Wis., is about ready for bids for construction of new \$200,000 central heating plant. Sidney P. Hall is vice-president and general manager.

Board of Vocational Education, Wisconsin Rapids, Wis., has plans by Hougen & Henderson, local architects, for \$50,000 addition to vocational training institute, 87 x 116 ft., one-story, for machine shop and automotive mechanics departments. W. A. Sprise is director.

City Council, Tigerton, Wis., has authorized bond issue of \$50,000 for construction and equipment of waterworks plant and distribution system. Plans are being prepared by Druar & Malinowski, consulting engineers, 500 Globe Building, St. Paul, Minn.

◀ SOUTH CENTRAL ▶

Kentucky Brewing Co., 1445 South Fifteenth Street, Louisville, plans addition to plant, primarily for a mechanical-bottling works. Cost close to \$200,000 with equipment. A bond issue of \$250,000 has been authorized.

Batson & Hatten Lumber Co., Lyman, Miss., has begun erection of new plant for manufacture of chemical products, including turpentine and allied specialties. Cost close to \$200,000 with machinery.

Board of Trustees, Morehead State Teachers' College, Morehead, Ky., plans new central light and power plant. Cost over \$50,000 with equipment. Financing has been arranged.

City Council, Decatur, Ala., plans early call for bids for municipal electrical distribution system. Fund of \$350,000 has been secured through Federal aid. Power supply will be furnished from system of TVA. Francis & Haley, Brown-Marx Building, Birmingham, are consulting engineers.

Southland Chemicals, Inc., 10 Cummings Station, Nashville, Tenn., recently organized by G. P. Blair and G. M. Smith, plans new plant for manufacture of industrial chemical products on site near city. Cost over \$50,000 with equipment.

◀ MICHIGAN DISTRICT ▶

Murray Corp. of America, Inc., 1424 Aberle Street, Detroit, manufacturer of steel automobile bodies and other steel and metal stampings, has let general contract to Otto Misch Co., 159 East Columbia Street, for one-story addition to heavy stamping division plant. Ecorse, 80 x 260 ft. Cost over \$85,000 with equipment.

Chandler-Groves Co., 5932 Vancouver Avenue, Detroit, has been organized by Walter B. Groves, 18975 Oak Drive, capital \$200,000, to manufacture automotive devices and equipment.

C. & K. Brewery, Hamtramck, Mich., has plans for addition, primarily as a main brew-house. New 200-bbl. brew kettles, conveyors and other equipment will be installed. Cost over \$50,000 with equipment.

◀ SOUTH ATLANTIC ▶

Premier Brewing Co., High Point, N. C., recently organized by J. Berg von Linde, High Point, and associates, with capital of \$500,000, has acquired about 15 acre tract on High Point-Greensboro highway, as site for new brewery. Plant will include steam power house and machine shop. Grattan Fox, president, High Point Paper Box Co., High Point, is interested in new company.

Florida Cane Products Corp., 139 N. E. First Street, Miami, Fla., W. C. Chadwick, vice-president, has plans for new distilling plant, including storage and distributing units. Cost over \$70,000 with equipment. It

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HIGH PHYSICALS
without elaborate treatment

HERE'S a steel that has been called "fool-proof" from a heat-treating standpoint. It can be brought to the desired tensile strength by a simple quenching and drawing treatment.

Illinois' S. A. E. 6150 is uniform in grain structure and has high resistance to shock. It is readily forged and can be

machined to a fine finish. It is subject to only slight distortion under oil hardening and hence is useful for parts which must be heat treated after machining.

Illinois Steel Company will be glad to furnish further information on this or other alloy steels—or to consult with you regarding applications to your specific needs.

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ALWAYS DEPENDABLE

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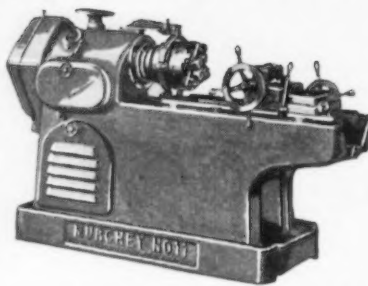
A few features of the new Murchey No. 11 and No. 22 Threading Machines:

Die Head with *ground* circular chasers for long life and accuracy. Positive opening and closing, and size adjustment for close tolerances.

Centralized Controls including spindle speed indicator, and a hand wheel for changing spindle speeds from 72 to 386 r.p.m. while motor is running.

Pump easily removed for cleaning. All gears and bearings run in oil. Alloy steel lead screws.

No. 11 machine in single and double head types cuts machine



threads from $\frac{1}{4}$ " to 1", and from $\frac{1}{8}$ " to $\frac{3}{4}$ " pipe threads.

No. 22 machine (double head only) cuts machine threads from $\frac{1}{2}$ " to 2", and from $\frac{1}{4}$ " to 2" pipe threads.

MURCHEY MACHINE & TOOL CO.
951 PORTER STREET DETROIT, MICHIGAN

is proposed to begin work early in spring. Robert M. Little, Twenty-fourth Street and Ocean Boulevard, Miami Beach, is architect; Jorgenson & Shreffler, News Tower Building, Miami, are consulting engineers.

City Council, Winston-Salem, N. C., is considering new municipal electric light and power plant. Cost over \$175,000 with equipment. W. C. Olsen, Raleigh, N. C., is consulting engineer.

Permanent Seal Casket & Vault Co., Charlotte, N. C., has been organized, capital \$100,000, by N. J. Phillips and A. R. Moore. Blandwood Apartments, to manufacture metal caskets, vaults and kindred products.

◀ WESTERN PA. DISTRICT ▶

Pittsburgh Plate Glass Co., Grant Building, Pittsburgh, has acquired property at Birmingham as site for one-story factory branch, 110 x 200 ft., with cutting, storage and distributing departments. Cost about \$50,000 with equipment. Miller & Martin, Title Guarantee Building, Birmingham, are architects.

American Lime & Stone Co., Bellefonte, Pa., plans extensions and improvements, including installation of large rotary kiln and auxiliary equipment. Cost about \$85,000 with machinery.

Givaudan-Virginia, Inc., Security Bank & Trust Building, Charleston, W. Va., Dr. Ludwig Valik, general manager, recently organized, has acquired tract at Belle, W. Va., near works of Belle Alkali Co., and plans early erection of plant for manufacture of chemical products. Cost over \$75,000 including machinery.

◀ WASHINGTON DISTRICT ▶

Procurement Officer, Chemical Warfare Service, Edgewood Arsenal, Md., asks bids until Feb. 4 for one motor-driven centrifugal pump (Circular 81), one indicating high-resistance pyrometer and four rotameters (Circular 82), one 8080-gal. and one 2000-gal. fuel oil storage tanks (Circular 83).

General Purchasing Officer, Panama Canal, Washington, asks bids until Feb. 7 for wire rope, seamless brass pipe, phosphor bronze spring wire, one drill grinding machine, drill chucks, 72,000 lb. nails, 11,000 lb. finishing nails, steel tackle blocks, welding goggles, 100,000 lb. galvanized sheet steel, 3000 lb. corrosion-resisting steel plates, 13,600 lb. sheet copper, 7400 lb. rolled naval brass, 10,000 lb. rolled plate zinc, 5000 lb. soft steel wire, 300 lb. electric welding rods and other supplies (Schedule 3026).

Quartermaster Depot, Twentieth and C Streets, N. W., Washington, asks bids until Feb. 15 for 350 5-kw. gasoline-electric generator sets (Circular 89).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Feb. 5 for four portable power units for cranking airplane engines for Sewall's Point and San Diego navy yards (Schedule 4137); until Feb. 15, six motor-driven compressor sets, with ammeters, voltmeters and spare parts for Portsmouth and Mare Island yards (Schedule 4175).

◀ FOREIGN ▶

Fairey Aviation Co., Ltd., Hayes, Middlesex, England, C. R. Fairey, president, has acquired large factory at Heaton Chapel, Manchester, England, and will improve for manufacture of speed airplanes for military and other service, including parts production and assembling.

Ministry of Public Works, Cairo, Egypt, asks bids until March 5 for new electric power transmission line in Fua and Balamoon districts. Plans at office of Egyptian Consulate Royal, Russ Building, San Francisco.

Normandy Park Steel Works, Scunthorpe, North Lincolnshire, England, operated by John Lysaght & Co., Ltd., specializing in steel products for automotive industry, plans a continuous mill for rolling steel sheets for automobile bodies. Cost over \$350,000 with machinery.

◀ PACIFIC COAST ▶

Alaska Packers Corp., 111 California Street, San Francisco, food packer, has let general contract to O. Monson, 475 Sixth Street, for one-story factory branch, storage and distributing plant at Alameda, Cal., 100 x 200 ft. Cost about \$45,000 with equipment.

Bakersfield Brewing Co., 1660 Chester Avenue, Bakersfield, Cal., C. Fred Baker, secretary, will soon begin superstructure for new three-story and basement brew-house, with one-story structure for mechanical-bottling unit. Cost over \$80,000 with equipment.

Pacific Can Co., 290 Division Street, San Francisco, has plans for new two-story factory at Stockton, Cal., where 20-acre tract was recently acquired. Cost about \$60,000 with equipment. Other plant units will be built later. Ellison & Russell, Pacific Building, San Francisco, are consulting engineers.

Bureau of Reclamation, Denver, asks bids until Feb. 6 for three 5000-gal. per min. deep-well, motor-driven turbine-type pumping units; one similar pumping unit, 1600 gal. per min., and two portable pumping units, same type, each 1500 gal. per min., for Boulder Dam, Boulder Canyon Project, California-Nevada-Arizona (Specification 654-D); until Feb. 11, one portable, high-potential test set and portable dielectric testing equipment, same project (Specification 655-D).

Hemrich Brewing Co., 5225 East Marginal Way, Seattle, has plans for mechanical bottling works unit and expansion in storage and distribution department. Cost about \$65,000 with equipment. J. P. Lynch is company superintendent in charge.

National City Packing Co., National City, Cal., food packer, plans addition and improvements in present plant. Cost about \$35,000 with equipment. Frank L. Hope, Jr., Commonwealth Building, San Diego, Cal., is architect.

Railroads Create Research Board

CREATION of the research advisory board of the Association of American Railroads has just been announced by J. J. Pelley, president of this association. The purposes of the new board include the following:

1. Assist in the organization of the new department of planning and research which the association is forming.
2. Advise as to plans not only for continuing research activities which the railroads already have in progress but as to plans for research which the association has in contemplation.
3. Suggest new matters pertaining to operation, equipment or other activities connected with rail transportation to which definite attention should be given in the field of research.

The members of the research advisory board appointed by Mr. Pelley are Dr. Karl T. Compton, president, Massachusetts Institute of Technology, Cambridge, Mass.; Dr. Harold G. Moulton, president, Brookings Institution, Washington; Dr. A. A. Potter, dean of the engineering schools, Purdue University, Lafayette, Ind.

At a meeting of the board held recently in Washington, Lawrence W. Wallace, vice-president, W. S. Lee Engineering Corp., Washington, and a well-known consulting engineer, was selected as director of equipment research. Mr. Wallace will be in charge of all research work relating to motive power and car equipment, both freight and passenger. This work has heretofore been conducted by Harley A. Johnson, of Chicago, who has been employed on a part-time basis but who has resigned to devote his entire time to the Chicago traction interests with which he has been connected for many years.

THERE are a number of good reasons to specify Blaw-Knox Electroforged Grating. First of all, it is most economical because of its permanency; there is practically no maintenance required, no rivets or bolts to come loose and rattle or allow the structure to become wobbly. The twisted bar construction provides a non-slip

Blaw-Knox Electroforged Grating is preferred.

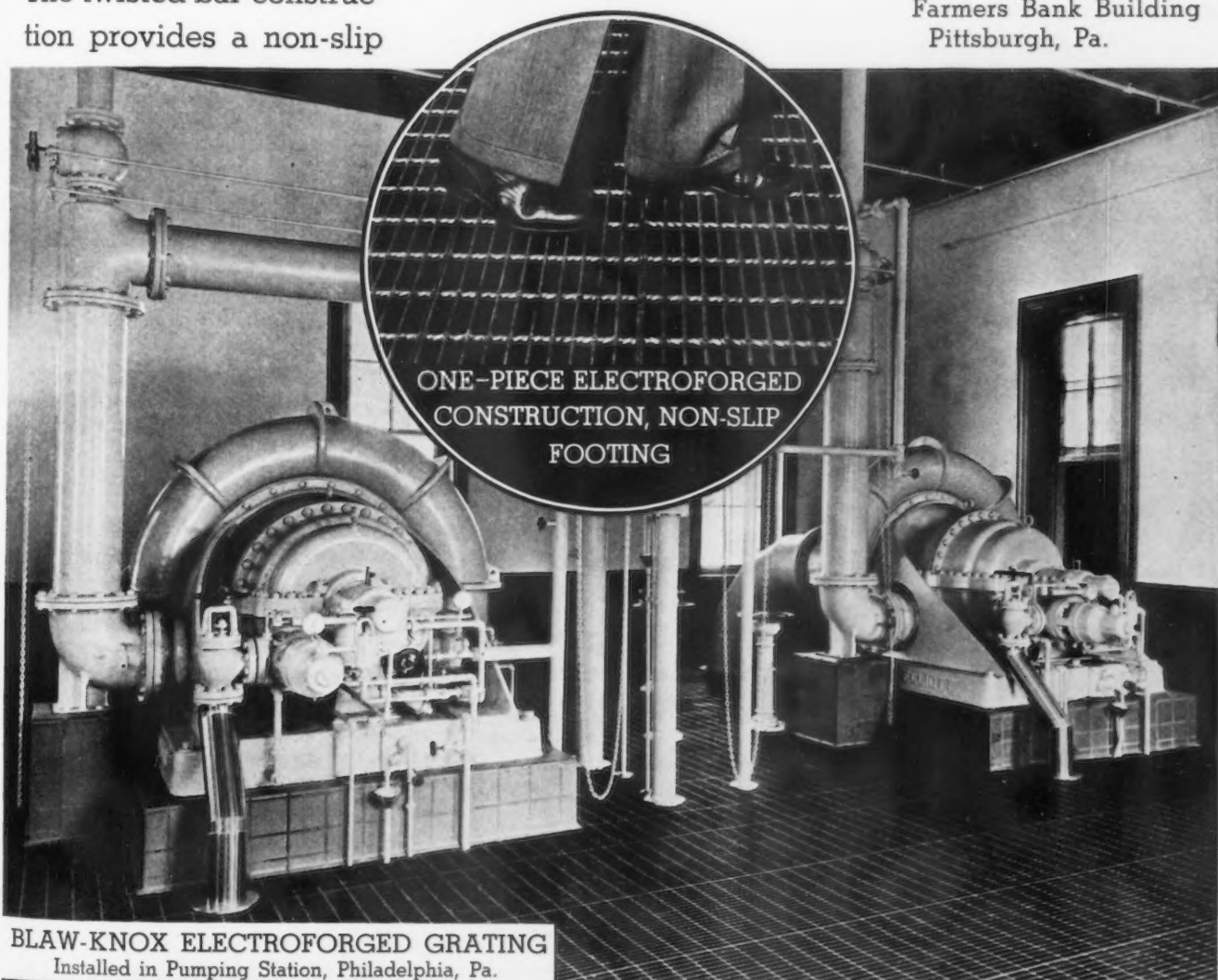
footing for all who may have to walk upon it, but offers no obstruction to rolling loads. The open area for light and air is maximum. All surfaces are without cracks or crev-

ices and are easily painted to prevent corrosion.

Send for sample and catalog—see for yourself why modern engineering has endorsed this superior grating.

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COMPANY**

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BLAW-KNOX

AUTOMATIC BLOWPIPE

by WELDIT

for
ARTIFICIAL GAS
NATURAL GAS
BUTANE AND
COMPRESSED AIR

If you have a heating ~
annealing or soldering
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WELDIT ACETYLENE COMPANY
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Foreign Trade Circulars Now Available

THE following circulars published during the last six months are available at 10c. a copy on application to the Division of Regional Information, Department of Commerce, or to any of the Bureau's district offices:

No.	DATE	SUBJECT
294	June	Italian Foreign Trade in 1933.
295	June	Uruguayan Foreign Trade in 1933.
296	June	Foreign Trade and Business Conditions in Manchuria.
297	June	French Trade with its Colonies.
298	June	Foreign Trade in Chile in 1933.
299	June	Summary of European Budgets.
300	June	Cuban Foreign Trade in 1933.
301	June	Economic Notes on Japan.
302	July	Mexican Foreign Trade in 1933.
303	July	Economic Notes on Philippine Islands.
304	July	Foreign Trade of Peru in 1933.
305	August	Foreign Trade and Economic Conditions in Egypt.
306	August	German Industrial Census of 1933.
307	August	Cartels under the National Socialist Government in Germany.
308	September	Foreign Trade of Sweden in 1933.
309	September	Foreign Trade of Baltic States in 1933.
310	September	Japan's Export Credit System.

311	September	Trade of Chile for First Six Months of 1934.
312	September	U. S. Trade with Far East in 1933.
313	October	Foreign Trade of Norway in 1933 and first half of 1934.
314	October	Peruvian Trade for first six months of 1934.
315	October	German Foreign Trade in 1933 and first six months of 1934.
316	October	Manufacturing in Brazil.
317	October	Japanese Goods Imported into the Philippines.
318	October	Belgian Foreign Trade in 1933.
319	November	Foreign Trade and Review of Economic Conditions in Persia.
320	November	Foreign Trade in Denmark in 1933 and Jan.-Aug., 1934.
321	November	What Manchuria Buys from the United States.
322	November	Foreign Trade in Bolivia in 1933.
323	November	Manufacturing in Mexico.
324	November	Manufacturing in Peru.
325	December	Turkey: A Review of Economic Conditions in 1934.

The Heil Co., 3000 West Montana Street, Milwaukee, has received order from the Standard Oil Co. of New Jersey for 100 tank-truck bodies of special design and constructed mainly of aluminum, valued at approximately \$250,000. Order is claimed to be the largest ever placed for similar equipment. Heil Co. also has substantial orders for tank equipment for Socony-Vacuum Co., Pan-American Oil Co., Texas Corp., Wadhams Oil Co. and for milk transports for Hershey Corp.

Grinding Operations on Acme-Gridley Parts

(CONCLUDED FROM PAGE 22)

work locates over a taper holder that fits the headstock spindle and is held in place with a bolt and U-washer. The headstock is set over on its axis to generate the desired angle. The wheel is Alundum, 12 in. in diameter, 1 in. face, 24 combination grit, K grade, operated at a peripheral speed of 5000 ft. per min. The work speed is about 60 r.p.m. After placing the holder in position it is tested with a dial indicator to make sure that it runs true and under these conditions the outer and inner diameters of the work will be concentric.

Several Blanchard surface grinders are in constant operation at the National Acme plant for finishing a diversity of flat surfaces. The operation shown in Fig. 14 consists of surfacing tool slides which are old style units required as repair parts. The ground surfaces on these parts are approximately 7 in. x 8 in. The castings are semi-steel and the grinding is done from the rough. As the illustration shows, five parts are located on the rotary magnetic chuck for simultaneous grinding within a retaining ring which can be seen near the outer diameter of the chuck.

The wheel used on this machine is a Carborundum segmental unit composed of six segments 6 in. long with a 2-in. grinding face. The grit is 30 and the grade U-12. The wheel thus built up is 20 in. in diameter, and is operated at a surface speed of 5000 ft. per min. The chuck speed varies with the work to be ground, but in this instance it is 20 r.p.m. The work is shown with the chuck brought forward to the loading position. For grinding, the chuck is fed under the wheel so that the wheel rim is approximately over the center of the chuck.

The foregoing shows the care exercised in each operation to assure accuracy. Accurate grinding of various parts assures built-in accuracy of the finished machine. Further, it assures the interchangeability necessary when repair parts must be fitted.

Two grinding departments are in operation at the National Acme plant, each under the supervision of an abrasive expert of long training.

3 GOOD REASONS

why you should use

ALUMINUM SCREW-MACHINE RODS

CONCEDED QUALITY

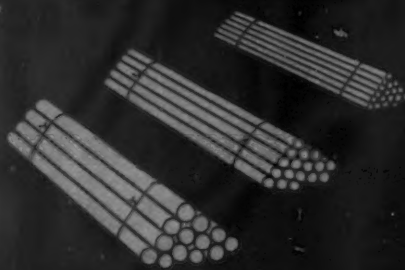
Aluminum is decidedly advantageous for many screw-machine products. Its light weight, resistance to all kinds of atmospheric corrosion, modern color — such unique characteristics recommend it first for many applications. But also for thousands of other applications, where no special qualifications are called for, you owe it to yourself to get the latest facts about Alcoa Aluminum Screw Machine Rods.

CONVENIENT STOCKS

You will find, for instance, that there is now available a real working stock of Alcoa Screw Machine Rods within over-night delivery of your plant. All standard rounds are included in these stocks, with a few extra for good measure. Hexes, too. Rapidly increasing use of Alcoa Aluminum Screw Machine Rods created these stocks. And there is an obvious moral in that increasing use.

COMPARABLE COSTS

You will find, too, if you haven't investigated recently, that advanced techniques are cutting machining costs. You remember, of course, that when you compare per-pound costs, a pound of Aluminum gives you three feet of stock for every foot you get out of a pound of heavy metals. And if you haven't checked recently the actual cost of parts made of Alcoa Aluminum stock, that is very much worth looking into. Aluminum Company of America, 1885 Gulf Building, Pittsburgh, Pa.



ALCOA · ALUMINUM



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ARMATURE BINDING TINNED

Coils—Spools—Reels

Well tinned for easy soldering
All grades and sizes

*Laboratory control of all processes
insures uniform quality.*

DETROIT WAREHOUSE—1501 BEARD ST.

NEW ENGLAND HIGH-CARBON WIRE CO.

MILLBURY, MASS.

German Steel Industry Thrives on Barter — Cartel Quotas Exceeded

HAMBURG, Jan. 21 (*By Special Correspondence*).—The German steel industry closed 1934 not in seeking fresh export business, but in avoiding it. Having grossly exceeded her allotment in the Continental steel cartel, the industry had to pay the fixed penalties for excess allotments, which start at 75c. a ton for 10,000 tons and range upward to \$1.50 a ton for more than 100,000 tons. But at the end of the year other members of the cartel were refusing to accept further payments from the German industry and were demanding that German mills should stop exporting altogether.

The Germans could pay the penalties easily enough. It has been estimated that the mills reduced their production costs in 1934 by more than 8 M. per ton because of heavy production. It is believed that the industry when working at less than 48 per cent of the capacity is not able to earn fixed charges, but when above 48 per cent is able to show profits. At 70 per cent production costs are proportionally reduced.

The German industry made large profits in 1934, particularly in the second half of the year. Part of the profit was used for price reductions. On Jan. 1, prices for wire products were cut by 7 to 8 M. per ton and the extras on alloy drawn steel and bright hoops were reduced. Another part is being used for replacing obsolete machinery

and plant. Other profits are being used for the construction of new plants, chiefly coal distillation plants. No less than seven plants are under construction where petrol and oil will be derived from coal. Another improvement is sulphur regeneration from gas of the coke ovens and blast furnaces. In 1935 Germany will thus obtain her entire requirements of sulphur from these two sources.

The tension which is felt at present between the German industry and the other members of the Continental cartel may lead to the collapse of the cartel, if the other members will not make revisions whereby the German industry may book tonnage by barter. It is almost certain, however, that some sort of a settlement will be possible. The German works have already obtained a higher allotment in the tube cartel and recently in the international ship plate cartel.

The German steel cartels are reviewing their business, particularly the outlook for 1935, and it is unanimously believed that the new year will bring as much business as 1934. The export barter trade, at first laughed at by other countries, has brought export business to Germany which was not thought of in 1932 or 1933. Domestic business is satisfactory, all provinces are buying and spring demand, usually commencing at the end of January, started in the second half of December. Wire or-

ders in December exceeded those of December, 1933, by nearly 25 per cent and the same month of 1932 by more than 40 per cent.

Krupp and five other makers in the Ost-Konsortium, which in November signed a barter agreement with Turkey concerning exchange of railroad track material, locomotives, cars, etc., worth \$9,000,000 against raw products, have signed another \$7,000,000 contract with Turkey calling for the establishment of a steel plant in that country. All machinery and equipment will be supplied by Germany. Payment will be made in mohair, wool, cotton, dried fruits, hides and skins, and mineral ores.

The German machinery industry reemployed 5000 men in November and is now operating at approximately 63.5 per cent of capacity, compared with 61.5 per cent in October. Since January, 1933, the machine tool industry has increased operations by nearly 80 per cent. Export business with Russia is at a standstill, the Government having refused to guarantee exports.

It has been announced recently that export credit insurance will be renewed on shipments to Russia when Russian debts decline below 200,000,000 M. With all other countries business is better than in recent years. November exports of machinery were 9 per cent higher than November, 1933.

The international wire rod cartel has fixed the allotment for the first quarter of 1935 at 350,000 tons, an increase of 30,000 tons over the last quarter of 1934. The cartel is buying quantities offered by the Polish industry in order to support the market. German consumption has been nearly 70 per cent ahead of the previous year.

The pig iron export trade has been reorganized. In the future all the trade will be placed with the three coastal works consisting of eight stacks situated at Bremen, Lübeck and Stettin. As export prices are very low, these works will get from the pig iron cartel a bonus equal to the average price of all domestic and export sales of the cartel during a month. The furnaces, working chiefly with imported raw materials, will obtain all their requirements by barter.

Agreements have been arranged by which the ore and coal imports will be paid for directly by shipments of pig iron, and only the exceeding value of pig iron shipped will be paid through banks. The cartel hopes thereby to expand the export business in pig iron considerably. Such countries as Britain and Sweden, which usually buy no German iron, may now be expected to take German iron, and this will be surplus business which will help to reduce the production costs on other business.